EPSON®

Equity™ III+

User's Guide

Y12699112300

IMPORTANT NOTICE
DISCLAIMER OF WARRANTY

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IBM is a registered trademark and AT and XT are trademarks of International Business Machines Corp.

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FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult- the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"Television Interference Handbook"

This booklet is available from the U.S. Government Printing Office, Washington DC 20402. Stock No. 004-000-00450-7.

Note: If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem:

Disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Epson peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Epson peripheral devices contact the manufacturer or dealer for assistance.

WARNING

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

The connection of a nonshielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment.

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Introduction

Your Epson Equity III+ personal computer is a versatile, high-performance system which offers you a wide variety of choices. First you choose between two models of the Equity III+ main unit, then select the monitor and peripherals you want to use with it to assemble the configuration that does the most for you.

The Equity III+ main unit is available in these models:

- One 1.2MB (megabyte) high-density floppy disk drive
- One 1.2MB floppy disk drive and one 40MB internal hard disk drive.

Both models include 640KB (kilobytes) of memory. You can install additional drives in your Equity III+ to increase its storage capacity: another floppy disk drive (360KB, 720KB, or 1.2MB) and one or more hard disks (10MB, 20MB, 40MB, etc.).

Optional cards and external devices further expand the capabilities of your Equity III+. Its serial and parallel interfaces let you connect almost any peripheral device you choose. Here are some options you can use with your system:

- Monochrome monitor (green or amber)
- Monochrome video card
- RGB (red, green, blue) color monitor or RGB enhanced color monitor
- Composite color monitor
- Color/graphics video card
- Graphics or enhanced graphics video card
- Memory expansion card
- 80287 Math coprocessor
- An Epson printer or plotter.

You can also use most cards for the IBM® Personal Computer, PC XT™, and PC AT™ on the Equity III+. Check with your Epson dealer from time to time to find out which peripherals and option cards are available.

The Equity III+ comes with the MS™-DOS operating system and the GW™-BASIC programming language. If you have used MS-DOS before on another computer, you will find that it works the same on the Equity III+. Be sure to refer to your Equity MS-DOS manual, however, for descriptions of the special utility programs added by Epson.

You may have purchased other software; you can use most software products designed for the IBM PC, PC XT, and PC AT on your Equity III+. Refer to your software program documentation for information on using the software.

Additionally, the Equity III+ supports multiple users and multiple tasking with the appropriate operating system. Consult your Epson dealer for more information.

How to Use this Manual

This user's guide explains how to set up and care for your Equity III+. It also describes how to start using your system and install optional devices. You may not need to read everything in this book; some sections may describe a particular option or accessory you do not have.

Follow the instructions in Chapter 1 to set up and turn on your system. Chapter 2 describes some general operational procedures. Chapter 3 explains how disks and disk drives work and shows how to use them. Chapter 4 describes how to install and remove option cards. If you encounter a problem, refer to Chapter 5 for troubleshooting guidelines.

Appendix A describes how to change jumper settings inside the main unit when you install certain optional devices, Appendix B presents the Equity III+ hardware specifications, and Appendix C is a glossary of computer terms used in this manual. Refer to the glossary whenever you come across an unfamiliar word.

Chapter 1

Setting Up Your System

Setting up your Epson Equity III+ personal computer is easy. Just follow the steps in this chapter.

1 *Unpacking*

As you remove your system components from their cartons, be sure to inspect each piece. If anything is missing, looks damaged, or seems wrong, consult your Epson dealer.

Once you have unpacked your Equity III+ computer components and documentation, you should have the following:

- The main unit and power cord
- The keyboard with detachable cable
- Keys for locking the computer
- An MS-DOS operating system diskette (version 3.2) and a GW-BASIC programming language diskette with supplemental MS-DOS utilities
- An MS-DOS manual and a GW-BASIC manual
- A diagnostics and system-dependent utilities diskette and a Diagnostics manual
- This Equity III+ User's Guide.

In addition to these items, you probably bought a compatible video monitor and video card.

You'll also find a registration card with the main unit. Fill this card out now and mail it to Epson. With your registration card on file, Epson can send you update information.

Be sure to keep your packing materials. They provide the best protection possible for your computer if you need to move or ship it later.

Removing the disk drive protector sheet

A cardboard sheet occupies the diskette slot in the floppy disk drive. This sheet is inserted at the factory to protect the read/write heads. Be sure to remove it before you connect any cables. Turn the latch that covers the disk slot counterclockwise until it is horizontal. Carefully pull out the sheet. If you have an optional 360KB or 720KB drive as well, press the disk drive button to release the protector sheet.

Save the protector sheet and reinsert it whenever you move the computer, even if you just move it to another part of the room. If you don't plan to use your computer for a week or more, such as when you go on vacation, reinsert the protector sheet to help prevent dust from entering the disk drive.

2 *Choosing a Location*

Before you set up your new system, choose an appropriate place. Whether you use your computer at home or in the office, you need to find a comfortable, convenient location where it can run properly.

Choose a location that provides the following:

- A large, sturdy desk or table. Make sure it can easily support the weight of your system, including all its components.
- A flat, hard surface. Soft surfaces like beds and carpeted floors attract static electricity, which erases data on your disks and can damage the computer's circuitry. Soft surfaces also prevent proper ventilation.
- Good air circulation. Air must be able to move freely under the system as well as behind it. Leave several inches of space around the computer to allow ventilation.
- Moderate environmental conditions. You need to protect your computer from extremes in temperature, humidity, dust, and smoke. Avoid direct sunlight or any other source of heat. High humidity also hinders operation, so select a cool, dry area. Because you can't risk losing data stored on disk, do not expose your computer to dust and smoke which can damage disks and disk drives.
- Appropriate power sources. To prevent static charges, connect all your equipment to 3-prong, 120-volt grounded outlets. You need one outlet for the main unit, one for the monitor, and additional outlets for a printer and any other peripherals. The auxiliary power outlet on the rear panel of the Equity III+ reduces the number of wall outlets you need.

- No electromagnetic interference. Locate your system away from any electrical device that generates an electromagnetic field. Even a telephone can cause trouble, especially if you keep diskettes right **next to it.**

3 *Arranging the Components*

First decide how you want to arrange the different parts of your system. Figure 1-1 shows a typical setup.

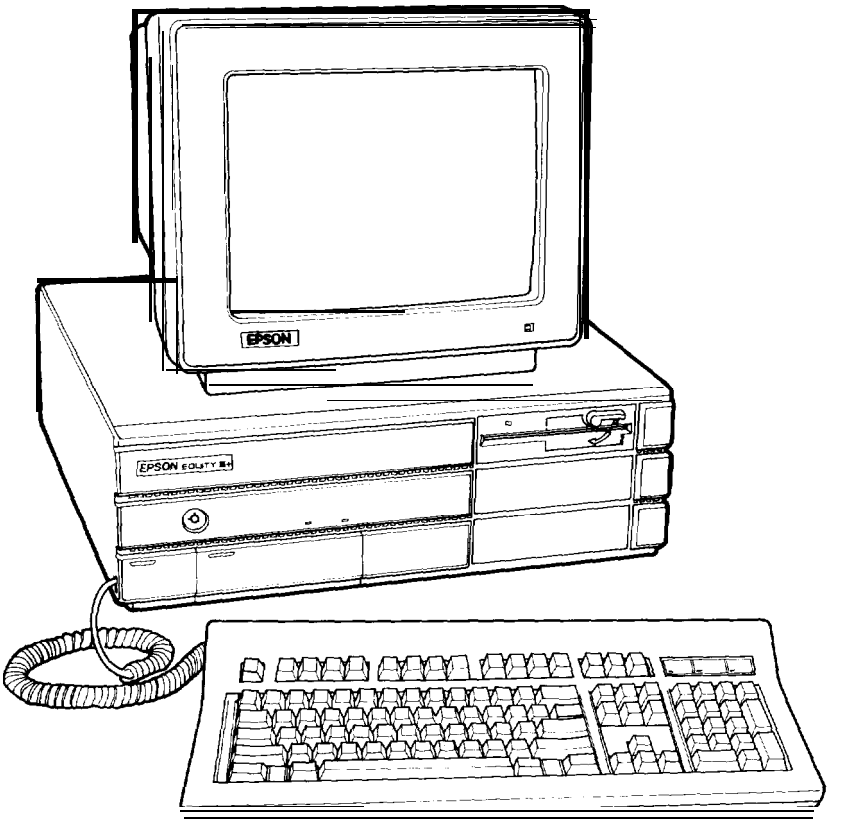

Figure 1-1. System *arrangement*

If you have special computer furniture or **want to** customize your setup, you can arrange your system components to suit your own needs.

Before you connect the cables, take a look at the front and back panels *of* the main unit.

The front panel

Figure 1-2 identifies the various components on the front panel.

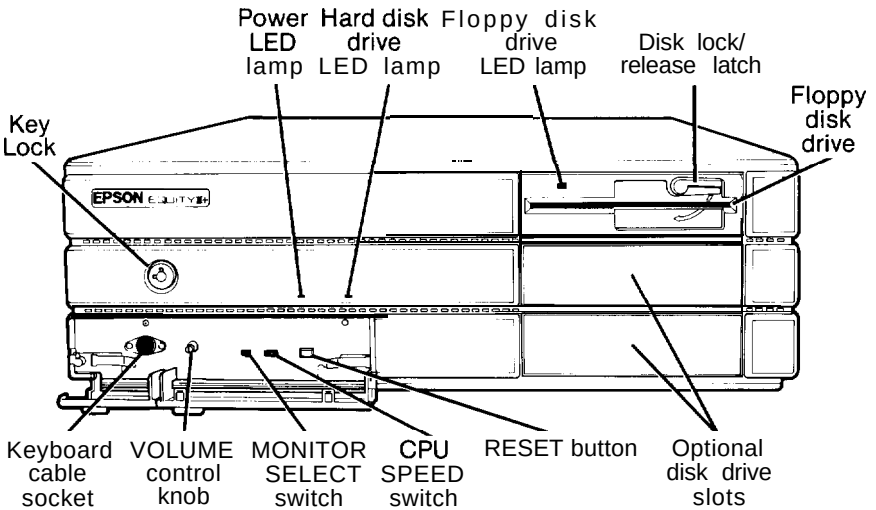

Figure *1-2. Front panel*

- Floppy disk drive. The top drive is a floppy disk drive that uses high-density (1.2MB) diskettes.
- Disk lock/release latch. To lock a diskette in place, turn this latch clockwise until it is vertical. To release a diskette, turn it counterclockwise until it is horizontal.
- Floppy disk drive LED lamp. A red light indicates that the drive is being accessed. To avoid losing data, never remove a diskette or turn off the computer's power when this light is on.
- Slots for optional disk drives. You can add another floppy disk drive (1.2MB, 720KB, or 360KB) and/or hard disk drive in these slots. All Equity III+ units come with at least one 1.2MB floppy disk drive.
- Hard disk drive LED lamp. A red light indicates that the drive is being accessed. To avoid losing data, do not turn off the computer's power when this light is on.
- Power LED lamp. When the light is on, the power is on. The light is red if the CPU (central processing unit) speed is 6 MHz, orange for 8 MHz, and green for 10 MHz.

- Key Lock. Use the key to lock the main unit and keyboard. Turn the key clockwise to lock the computer and counterclockwise to unlock it. You can remove the key in either position. (Locking the computer disables the RESET button.)
- RESET button. Press this button to reset the computer. When an operating system is running and the computer is unlocked, you can press the RESET button to reboot the system.
- CPU SPEED switch. Use this switch to select the CPU's execution speed: 6 MHz, 8 MHz, or 12 MHz, from left to right. Do nor change the speed while you are running a program.
- MONITOR SELECT switch. Slide this switch to the left if you are using a monochrome monitor or to the right if you are using a color monitor.
- VOLUME control. Turn the knob clockwise to make the computer's speaker louder, or counterclockwise to make it quieter.
- Keyboard cable socket. Plug in the keyboard cable here.

The back panel

Now look at the back panel to identify the input/output ports. Figure 1-3 shows where you connect your peripherals.

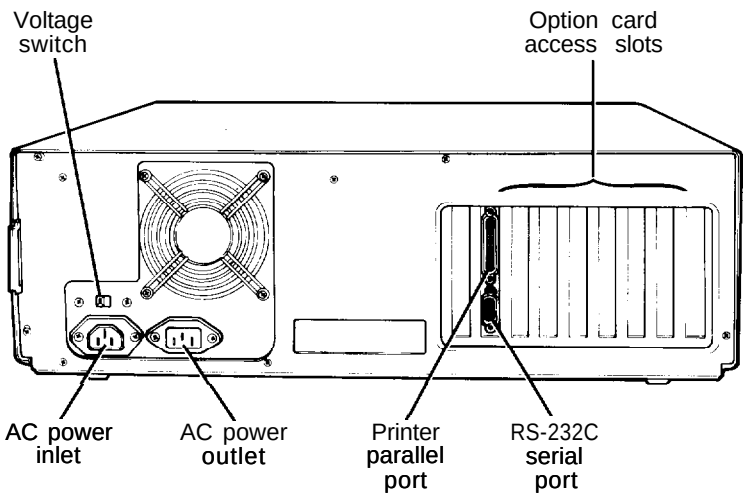

Figure 1-3. Back *panel*

WARNING: Connect all your peripherals before you plug in the power cable. After you plug in the power cable, always turn off the power switch before you connect or disconnect any peripheral.

- Voltage switch. Leave this switch at 115V for USA and Canadian use. Slide the switch to the right to select 230V for use in other countries (as necessary).
- AC Power outlet. Auxiliary power outlet. Some monitors (and other types of peripherals) can be plugged into the main unit here, instead of a wall outlet. The main unit's power switch controls the monitor or peripheral connected to this outlet.
- AC Power inlet. Plug the power cord into the main unit here. Be sure the power switch is off when you plug the power cord into an outlet.
- Printer parallel port. Allows you to connect a peripheral with a parallel interface, such as a printer or a plotter.
- RS-232C serial port. Allows you to connect a peripheral with a serial interface, such as a modem, another computer, or a printer.
- Option card access slots. The Equity III+ has nine slots to hold up to nine option cards. Option cards allow your computer to control your peripherals or enhance your computer's performance. One option card slot holds the hard disk controller card and another contains the parallel and serial interfaces as well as the floppy disk controller. You also need to use one or more slots for the video card(s) you purchased for your monitor. You can use the other slots to install additional options, such as a memory expansion card.

4 *Connecting the Power Cord*

Insert the power cord into the AC power inlet on the left side of the back panel, as shown in Figure 1-4. To avoid an electric shock, be sure to plug this end into the main unit before plugging the other end into the wall socket. For now, do not plug the power cord into an electrical outlet.

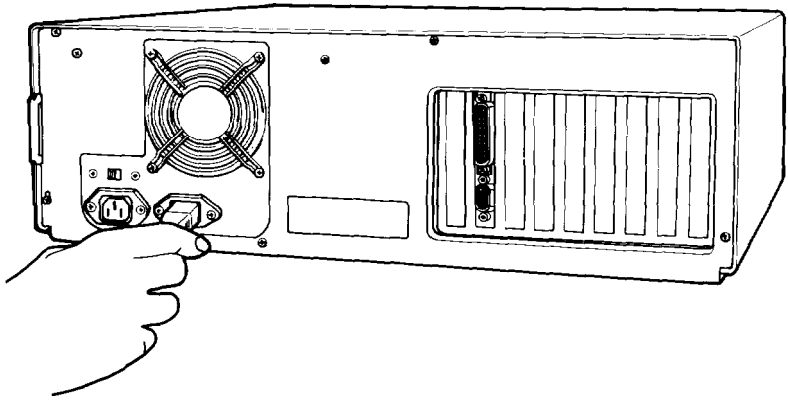

Figure 1-4. Connecting the power cord

5 Connecting a Video Monitor

The procedure you use to connect your monitor to the main unit depends on the type of monitor you have. Refer to your monitor manual for detailed instructions or follow the general guidelines below.

Note: Your dealer may have installed a video card in your main unit to control your monitor. If not, you need to install it before you can connect your monitor. See Chapter 4 for instructions on how to remove the main unit's cover and install an option card.

1. Place your monitor on top of or near the Equity III+ main unit. It is easiest to connect the monitor cable if the backs of the monitor and main unit face you.

2. If necessary, connect the monitor cable to the monitor. (Some monitors come with permanently attached cables.)

3. Connect the appropriate end of the monitor cable to your monochrome or color/graphics card connector at the back of the main unit, as shown in Figure 1-5. If the plug has retaining screws, tighten them with a screwdriver.

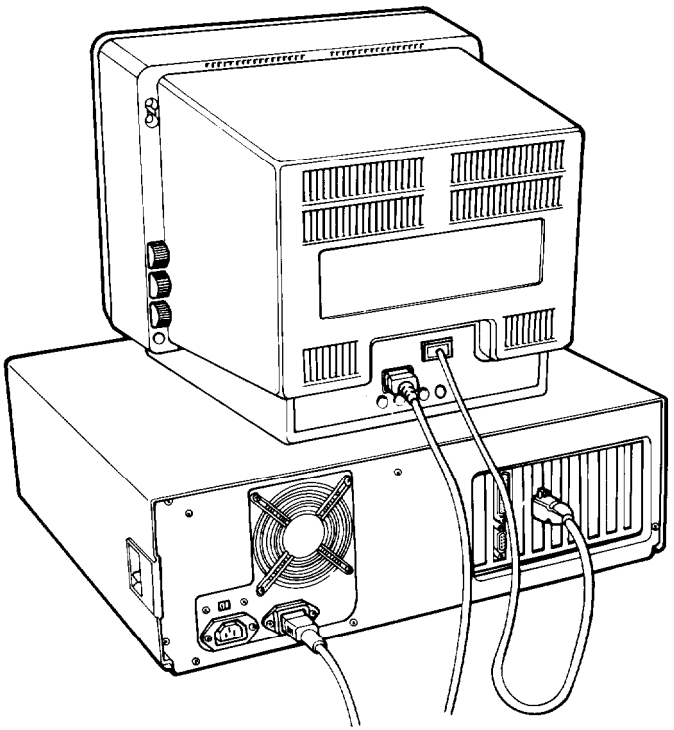

Figure 1-5. Connecting *the monitor*

The monitor type must match the video card in the main unit. If you have a color card, you can use one of two connectors: a nine-pin, female D-connector for RGB monitors or an RCA connector for composite video monitors. Consult Table 1-1 to make sure your card and monitor match.

Table 1-1. Monitor/video card compatibility

Monitor	**Video card**	**Output type**
Monochrome	Monochrome or graphics or enhanced graphics	One 9-pin output (TTL compatible)
Color or enhanced color	Graphics or color graphics or enhanced graphics	One 9-pin RGB output, or one RCA-type jack for composite video

Note: Be sure to set the switches on the video card to match your monitor.

4. Plug the monitor's power cable first into the power inlet on the monitor and then into an electrical outlet.

Note: If a monochrome monitor has the proper type of plug, you can plug it into the auxiliary outlet next to the power inlet at the back of the Equity III+ main unit.

5. Set the monitor switch on the front panel of the main unit for the type of monitor you are using. (See Figure 1-2.) Slide the switch to the left for a monochrome monitor or to the right for a color monitor.

6 *Connecting the Keyboard*

Follow these steps to connect the keyboard:

1. Connect the cable to the keyboard as shown in Figure 1-6. If there is a plastic band around the connector, remove it first.

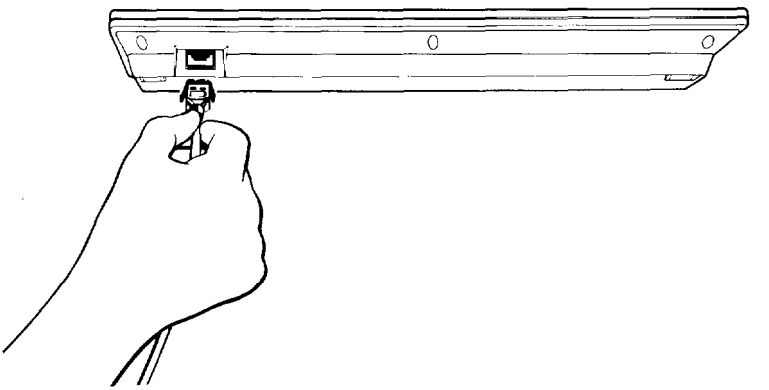

Figure 1-6. Connecting the cable to the keyboard

2. Open the cover on the lower left corner on the front panel of the main unit, as shown in Figure 1-7.

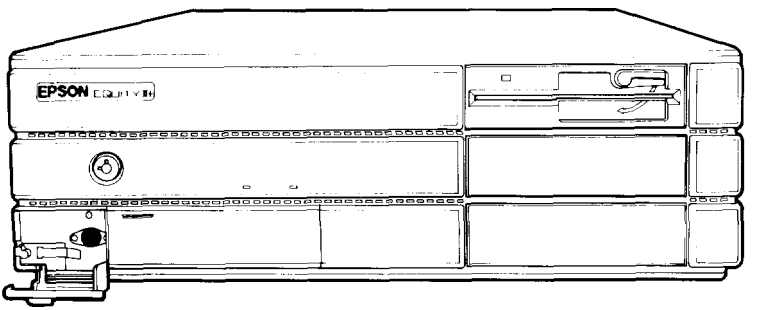

Figure 1-7. Opening the keyboard connector cover

3. Plug the other end of the cable into the keyboard socket, as shown in Figure 1-8. Do not force the connector, but be sure to insert it all the way.

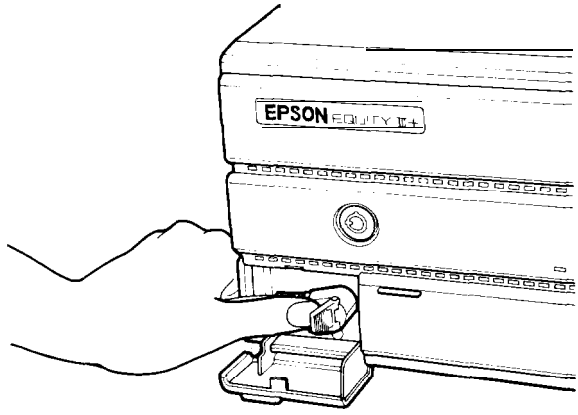

Figure *1-8. Plugging the keyboard cable into the main unit*

You can tilt the angle of the keyboard by adjusting the legs on the bottom. To adjust the legs, turn the keyboard over and lift each leg upward until it locks into place, as shown in Figure 1-9. You can adjust the legs to two different positions, or leave them flat.

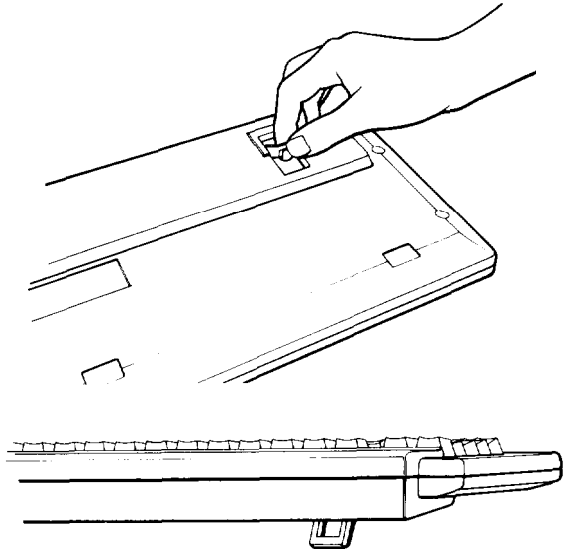

Figure 1-9. Adjusting the keyboard legs

7 Connecting a Printer

The Equity III+ has both parallel and serial interfaces. You can easily connect a printer or plotter that has either type of interface-just follow the instructions below. Epson offers a full range of printer products. Consult your dealer for more information.

Parallel interface

The Equity III+ parallel interface is Centronics®-compatible and uses a DB-25S connector. Most Epson printers have parallel interfaces.

To connect a printer to the main unit, you need an IBM-compatible printer cable. If you are not sure which one you need, consult your Epson dealer. Once you have a printer cable, follow these steps to connect your printer to the parallel interface on the main unit:

1. Place the printer next to your system.
2. Before you connect the printer, be sure the power switches on both the main unit and the monitor are off.
3. One end of the printer cable has a 25-pin male D-connector. (Refer to your printer manual to determine which end this is.) Connect this end to the parallel port on the back panel of the main unit, as shown in Figure 1-10. If the plug has retaining screws, tighten them with a small screwdriver.

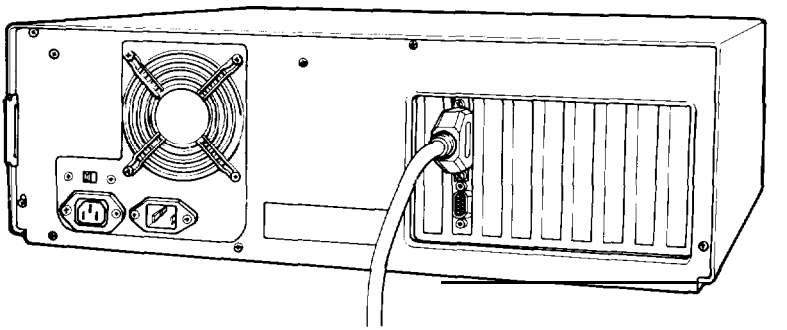

Figure 1-10. Connecting *the printer cable to the parallel port*

4. Connect the other end of the cable to the printer as shown in Figure 1-11. To secure the cable, tighten the squeeze locks at each side of the printer port and push them into the connectors on each side of the cable.

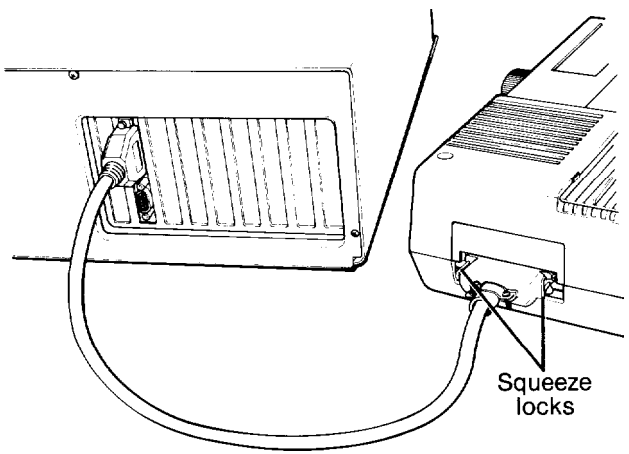

Figure 1-11. Connecting the printer

5. Plug the printer's power cable into an electrical outlet.

Serial interface

If you have a printer (or another peripheral such as a modem) with a serial interface, connect it to the serial (RS-232C) port at the back of the main unit. The Equity III+ uses a DB-9P connector, so be sure you have a compatible cable (or an adapting cable that converts the 9-pin output to the standard 25pin output). To connect a serial device, follow the same steps above for connecting a parallel device.

You need to ensure the serial port is set up so it functions properly. If you are using the port for a serial printer, you must also redirect printer output to the serial instead of the parallel port. Use the MS-DOS SETMODE program (or the MODE command) to make these changes. See your MS-DOS manual for instructions.

The Equity III+ character set

The Equity III+ uses a special character set that assigns graphics and international characters to some of the ASCII codes. In most cases, if you try to print these characters on a standard printer, you get italic characters

instead. Some Epson printers support the IBM character set (the character set the Equity III+ uses) as a standard feature, and others can be adapted. In addition, some application programs can print the special graphic characters on a standard printer when you use a special printer driver program. Ask your Epson dealer for more information.

8 Turning On the Computer

After you set up your system, you're ready to turn on the power and start using your Equity III+ computer. But before you turn it on, read the following safety rules.

Safety rules

Follow these rules to avoid accidentally damaging your computer or injuring yourself:

- Never turn the computer on or off with a protector sheet in the disk drive.
- Do not attempt to dismantle any part of the computer. Only remove the top cover to install and remove option cards. If there is a hardware problem you cannot solve after reading Chapter 5 on troubleshooting, or if you want to install an optional 80287 math coprocessor, consult your Epson dealer.
- Always turn off the power, disconnect the computer's power cord, and wait a few minutes before you remove the computer's cover.
- Do not unplug cables from the computer when the power switch is on.
- Never turn off or reset your computer while a disk drive light is on. This can destroy data stored on disk or make a whole disk unusable.
- Always wait at least five seconds after you switch the power off before you switch it on again. Turning the power off and on rapidly can damage the computer's circuitry.
- Do not leave a beverage on top of or next to your system or any of its components. Spilled liquid can damage the circuitry of your components.

Turning on the power switch

Now you are ready to turn on your system. It is a good idea to turn on the monitor and any peripheral devices before you turn on the main unit.

First, make sure the power cord is plugged into the power inlet on the back panel of the main unit. Then plug the power cable into a 3-prong, 120-volt, grounded electrical outlet. Turn on the monitor so you can see the messages that appear as your computer starts up. If you have a printer or other peripheral device, turn it on next.

You can turn on your computer with or without a system diskette in the top disk drive. For now, leave the drive empty. To turn on the computer, flip up the power switch on the right side of the main unit, as shown in Figure 1-12. The power indicator on the front panel lights up and the cooling fan inside the main unit starts. After a few seconds, the computer begins to perform an internal self test.

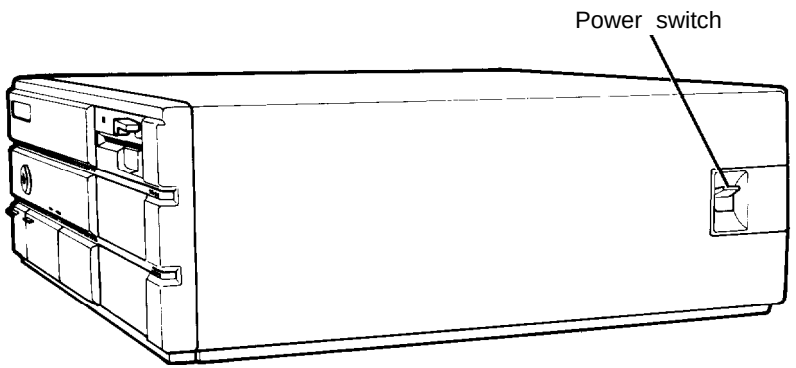

Figure *1-12. Turning on the power*

If you cannot see the screen display clearly, use the controls on your monitor to adjust the brightness and contrast until characters on the screen are clear and bright. If the display is not stable, check your monitor's horizontal and vertical hold controls.

Initial setup procedure

If this is the first time your Equity III+ has been used, you need to use the diagnostics diskette to perform an initial setup. This is a simple procedure which you must do at least once. You may need to do it again if you change your system configuration-by adding a disk drive, for example-or to change the system date or time. See your Diagnostics manual for instructions.

Initial screen display

After the computer completes its self test, a message tells you how much RAM (random access memory) is available, for example:

```
640 KB OK
```

Then the following message displays:

```
Non-System disk or disk error
Replace and strike any key when ready
```

This tells you the computer can now load an operating system from a diskette in the top drive. The Equity III+ needs a disk operating system (DOS) to function. It comes with MS-DOS version 3.2. If you want to use another operating system, consult your dealer.

To load an operating system, insert the system diskette you want to use (see "Inserting and Removing Diskettes" in Chapter 2). Refer to your MS-DOS (or other operating system) manual for details on how to use the system.

Note: Use only a backup copy of the system diskette for daily use and keep the original in a safe place. See your MS-DOS manual to find out how to make a backup copy.

If your system has a hard disk, you need to prepare it before you can run an operating system on it. Refer to "Using a Hard Disk Drive" in Chapter 3 and to your MS-DOS (or other operating system) manual for instructions on how to prepare a hard disk for use.

If your hard disk has been properly prepared and set up to automatically boot MS-DOS, the message above does not appear. Instead, the operating system loads when you turn on the computer. The date and time prompts display and then the system prompt:

```
C>
```

This indicates the hard disk has been assigned as drive C.

Chapter 2

Using the Equity III+

This chapter covers some basic procedures for using your Equity III+ computer and keyboard.

Locking the Computer

The key lock on the front panel allows you to disable the keyboard and RESET button and lock the top cover of the main unit for security. This provides a safeguard against someone accessing confidential information or altering your computer's internal hardware. The key lock also lets you run an application program, such as a screen demonstration, while disabling the keyboard so no one can interfere with the operation. With the keyboard locked, the computer does not respond to anything you enter.

You can lock the system whether the power is on or off. To lock it, insert the key with the notch pointing left and turn it clockwise as shown in Figure 2-1. You need to press it in slightly when you turn it. To unlock it, insert the key with the notch pointing up and turn the key counterclockwise. You can remove the key in either position.

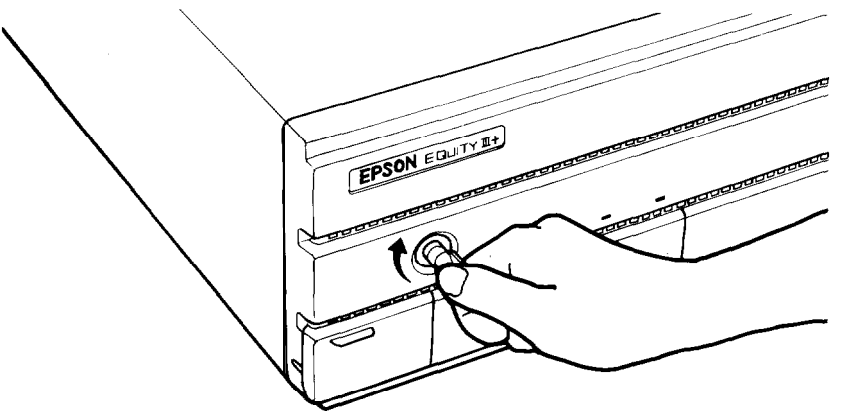

Figure 2-1. Locking the computer

Your Equity III+ comes with two keys; store them safely in different locations in case you misplace one. The keys come with an identification tag and an Epson ID card which contains the serial number and an address. If you need replacement keys, send your request to this address. Keep the ID card in a safe place, too; without the card, you cannot get replacement keys.

Be sure the computer is unlocked before you try to use the keyboard. Otherwise, it does not respond to anything you enter.

Inserting and Removing Diskettes

To insert a diskette into the 1.2MB floppy disk drive, hold it with the label face up and the write-protect notch to the left (so that the read / write slot is away from you). Then slide it into the disk drive as shown in Figure 2-2. When the diskette is all the way in, turn the latch clockwise until it locks into the vertical position. This keeps the diskette in place and enables the read / write heads in the disk drive to access the diskette.

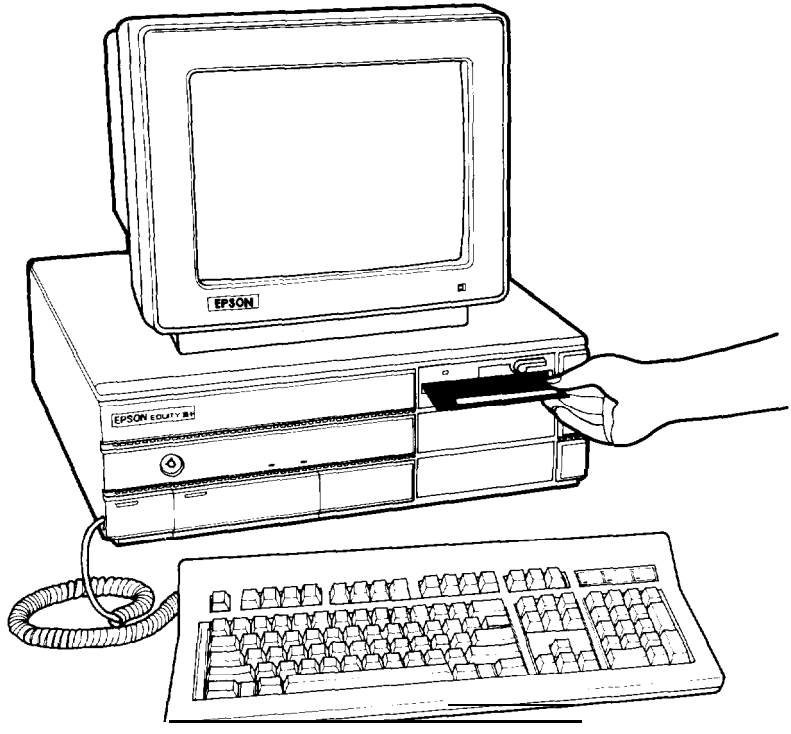

Figure 2-2. Inserting *a diskette*

To remove the diskette, turn the latch counterclockwise until it is horizontal and the diskette pops out. Carefully pull out the diskette, place it in its protective envelope, and store it properly, such as in a special diskette container.

If you have an optional 360KB or 720KB floppy disk drive as well, insert the diskette the same way as for a 1.2MB drive (with the label facing up). When it is all the way in, press the disk drive button to lock it in place. To remove the diskette, press the button to release it and pull it out of the drive.

WARNING: Never remove a diskette or turn off the computer while the drive indicator light is on. You could lose data. Also, be sure to remove all diskettes before you turn off the computer.

Special Keys on the Equity III+ Keyboard

Certain keys on your keyboard serve special functions when your computer is running application programs. Figure 2-3 shows the standard Equity III+ keyboard, and Table 2-1 describes the special keys.

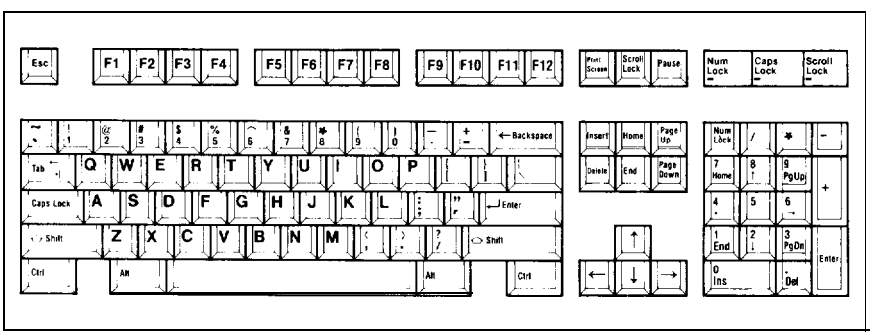

Figure 2-3. Standard keyboard

Table 2-1. Special keys

Key	Purpose
Tab |← →|	Moves the cursor to the right in normal mode and to the left in shift mode. Referred to as the tab key.
Caps Lock	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again.
Shift	Produces uppercase characters or symbols when used with the main character keys. Produces lowercase characters when **Caps Lock** is on.
Ctrl	Works with other keys to perform special (control) functions, such as editing operations in MS-DOS and GW-BASIC.
Alt	Works with other keys to enter alternate character codes.
← **Backspace**	Moves the cursor back one space, deleting the character to the left. Referred to as the backspace key.
↵ **Enter**	Ends a line of keyboard input or executes a command.
Insert (Ins)	Turns insert function on and off.
Delete (Del)	Deletes characters to the right.
Home, End **Page Up (Pg Up)** **Page Down (Pg Dn)** ↑ ← ↓ →	Within application programs, control cursor location.
Num Lock	Changes the function of the numeric/cursor keys from numeric to cursor positioning; changes back when pressed again.
Esc	Cancels the current command line or operation.
F1 — F12	Perform special functions within application programs.
Print Screen (Prt Sc)	Prints the screen display on a line printer.
Sys Req (Rq)	Generates the System Request function.
Scroll Lock	In some applications, controls scrolling.
Pause	Suspends current operation.
Break	Terminates current operation.

The **Num Lock, Scroll Lock,** and **Caps Lock** keys work as toggles when you press them. When the function is enabled, the corresponding light on the upper-right corner of the keyboard is on; when the function is disabled, the light is off.

Controlling the Volume

Your Equity III+ has a speaker which enables it to beep when you are using certain application programs. You can control the speaker's loudness with the VOLUME knob on the front panel. See Figure 2-4. Turn it to the right to make it louder or to the left to make it quieter.

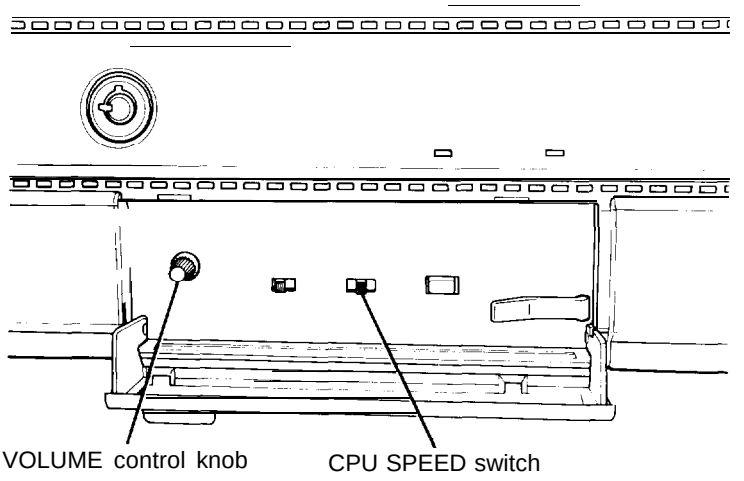

Figure 2-4. Volume control ***knob*** and CPU speed switch

Selecting Execution Speed

The Equity III+ can operate at three different execution speeds: 6 MHz, 8 MHz, or 12 MHz. At the faster speeds, the computer performs all tasks more rapidly. You can select the slower speed to run application programs that have specific timing requirements.

To change the speed, move the CPU SPEED switch on the front panel. (See Figure 2-4 above.)

When the computer is running at 6 MHz, the LED power light is red. At 8 MHz, the LED is orange, and at 10 MHz, the LED is green.

After you change the speed, you need to reset the computer by pressing the RESET button to make the new speed take effect. See "Resetting the Computer" below.

WARNING: Do not change the speed while you are running a program; if you do, the computer hangs up. Complete your current operation, exit the program, and then change the speed and press RESET.

Resetting the Computer

You can reset the computer to load a different operating system or to reload the current operating system. For example, if an error occurs and the computer does not respond to your keyboard commands, you can reset the computer and try the same operation again. However, resetting erases all data in the computer's temporary memory (RAM), so reset your computer only as a last resort.

In MS-DOS, you can hold down **Ctrl** and press C to stop a program's operation and return to the MS-DOS command prompt. If an error occurs, try this method before you reset the computer.

WARNING: Do not reset the computer to exit a program unless you have to. Some application programs classify and store new data whenever you exit the program properly. If you reset the computer while such a program is running, you may lose data.

There are three ways to reset. Because each is more powerful than the last, try them in the order listed here:

1. If you are using MS-DOS, hold down **Ctrl** and **Alt** and press the **Del** key on the numeric keypad at the right of the keyboard. The screen goes blank for a moment and then MS-DOS reloads. (MS-DOS must either be on the diskette or be autobootable from the hard disk.) If this does not correct the problem, try the second method.

2. Press the RESET button on the front panel. This method works even when the keyboard does not respond to your commands. If this does not correct the problem, try the third method.

3. Remove any diskettes from the floppy disk drives. Turn off the monitor and any peripheral devices and then turn off the Equity III+ using the power switch on the right side of the main unit. Wait five seconds and then switch the power back on.

Turning Off the Computer

Before you turn off your computer, save your data, exit the program you are using, and then remove all diskettes from the disk drives. Turn off your monitor and peripherals first, then turn off the main unit using the switch on the right side.

Chapter 3

Using Disks and Disk Drives

The disk drives in your computer allow you to store data on disk, and retrieve and use stored data when you like. All Equity III+ systems have at least one floppy disk drive; you may also have a hard disk drive and/or a second floppy disk drive in your system. This chapter explains how disks work and tells you how to:

- Choose floppy disks
- Care for your disks and disk drives
- Protect your data
- Use a single floppy disk drive
- Use a hard disk drive.

How Disks Work

The floppy disks (diskettes) you insert in your system's floppy disk drives are round pieces of flexible plastic coated with magnetic material and enclosed in protective jackets. Like a record, a diskette has circular tracks on both sides. The computer stores the data you enter as magnetic patterns on these circular tracks.

A small read/write head in the disk drive interprets the magnetic patterns. When a diskette is in a drive, the read/write head is right over the large oval hole in the diskette jacket. This hole allows the read/write head to access the diskette when you store, retrieve, and delete data.

Unlike a floppy disk, a hard disk is rigid and fixed in place. It is sealed in a protective environment free of dust and dirt, so you cannot see it. A hard disk stores data the same way as a floppy disk, only it works faster and has a much larger storage capacity.

Because data is stored magnetically, you can retrieve it, record over it, and erase it-just as you play, record, and erase music on cassette tapes.

Choosing Diskettes for the Equity III+

When you buy diskettes, be sure to choose high-quality diskettes with reinforced hub rings. The added reliability is well worth the extra cost. You also need to make sure you buy the proper format type for the drive(s) in your system.

The top floppy disk drive on the Equity III+ has a capacity of 1.2MB (megabytes) and uses 5¼-inch, high-density, soft-sectored, 96 TPI(tracks per inch) diskettes. Each high-density diskette can hold 1.2MB of data, or about 450 pages of text. (One megabyte equals 1,048,576 bytes.) These diskettes are compatible with those the IBM PC AT uses, so you can use diskettes prepared by one computer on the other.

If you have a second 1.2MB floppy disk drive, use the same high-density diskettes described above.

If you have a second floppy disk drive that has a capacity of 360KB (kilobytes), use 5¼-inch, double-sided, double-density, soft-sectored, 48 TPI diskettes in this drive. Each double-density diskette can hold 360KB of data, the equivalent of about 150 pages of text. (One kilobyte equals 1024 bytes.) These diskettes are compatible with those the IBM PC uses, so you can use diskettes prepared by one computer on the other.

If you have a floppy disk drive that has a capacity of 720KB, use 3½-inch, double-sided, high-density, soft-sectored, 135 TPI diskettes. Each diskette holds 720KB of data, approximately 300 pages of text.

You need to format new diskettes before you can use them with an operating system. Formatting erases all the data on a diskette and prepares it to receive new data, so be sure to format only new blank diskettes or diskettes that contain data you want to erase. Refer to your MS-DOS (or other operating system) manual for instructions on how to format diskettes.

Drive and diskette incompatibilities

Because of their size difference, you cannot use a 3½-inch diskette in a 5¼-inch drive or vice versa. Additionally, you need to be aware of some incompatibilities between the 1.2MB and 360KB drives and the diskettes they use. These incompatibilities apply to diskettes from other compatible computers as well.

You cannot use high-density diskettes in a 360KB drive. However, you can use double-density diskettes in a 1.2MB drive under the circumstances described below.

You can use a double-density diskette in a 1.2MB drive if you format it as a 360KB (or 320KB) diskette in the 1.2MB ***drive*** first. (Your MS-DOS or other operating system manual explains how to format a diskette in the density you choose.) After you do this, you can read and write to that diskette only when it is in a 1.2MB drive. If you write to it in a 360KB drive, it may become unusable in both drives. Also, you may not be able to read the diskette in a 360KB drive.

You can use a 1.2MB drive to read data from a double-density diskette that was formatted in a 360KB drive (for example, if you want to copy files from it). But do not write to this diskette while it is in a 1.2MB drive. If you do, the diskette may become unusable in both drives.

Here is a rule to follow: do not write to a diskette unless it was formatted in that drive (or the same type of drive on another computer). To avoid accidentally storing data on a diskette while it is in the wrong drive, you can place a write-protect tab on it before you insert it in the drive (see "Write-protecting diskettes" below).

Because of these incompatibilities, always be sure to indicate density and drive type when you label your diskettes.

Table 3-1 shows what types of diskettes to use in the three types of drives.

Table 3-1. Drive/diskette compatibility

Drive type	Diskette types it can read from	Diskette types it can write to
1.2MB	high-density, 5¼" double-density, 5¼"	high-density, 5¼" double-density, 5¼"*
360KB	double-density, 5¼"**	double-density, 5¼"**
720KB	high-density, 3½"	high-density, 3½"

*Only write to a double-density diskette in a 1.2MB drive if the diskette was formatted in that drive as a 360KB (or 320KB) diskette

**If you write to a double-density diskette in a 1.2MB drive, you may not be able to read or write to this diskette in a 360KB drive.

Note: Both types of 5¼-inch drives on the Equity III+ can read and write to single-sided double-density diskettes. However, do not write to a single-sided diskette while it is in a 1.2MB drive unless it was formatted in that drive as a double-density diskette.

If you have both types of 5¼-inch drives (360KB and 1.2MB), you can copy files from one drive to the other as long as the right diskette type is in each drive.

If you have two drives of different types and want to copy from one diskette to another of the same type, you need to use MS-DOS to change your system's drive configuration. You do this by inserting the MS-DOS command DRIVER.SYS in a configuration file. See "Device Drivers" in Chapter 7 of your MS-DOS manual for instructions.

You can copy files between a hard disk and any type of diskette. See your MS-DOS or other software manual for instructions on how to copy files.

Caring for your Disks and Disk Drives

To avoid damaging floppy and hard disks, you need to care for them properly. Take these precautions to avoid losing data:

- Keep disks away from dust and dirt. Small particles of dust or dirt scratch the magnetic surface and can destroy data. Dust can also ruin the read/write heads in a disk drive.
- Keep disks away from magnetic fields. (Remember that disks store data magnetically.) There are many sources of magnetism in your home or office, such as electrical appliances, telephones, and loudspeakers.
- Keep disks in a moderate environment. They work best at room-temperature and in normal humidity. Never leave diskettes sitting in the sun, or in extreme cold or heat. The temperature in a car in the middle of summer or winter can cause severe damage.
- Never touch a diskette's magnetic surface. The oils on your fingertips can damage it. Always hold a diskette by its protective jacket. On a 720KB diskette, do not expose the diskette's surface by sliding the metal plate.
- Store diskettes properly. When they are not in use, keep diskettes in their protective envelopes and store them in a diskette container.
- Do not place anything on top of your diskettes and be sure they do not bend or sag. They do not rotate properly in the drive if damaged.
- Never wipe, brush, or try to clean diskettes in any way.
- Be careful when you label diskettes. Attach labels firmly but gently, and only along the top of a diskette (next to the manufacturer's label). Do not place several labels on top of one another; too many labels can prevent a diskette from spinning freely in a disk drive.
- It is best to write on a label before you attach it to a diskette. Use only soft-tip pens (not ballpoint pens or pencils) to write on a label that is already on a diskette.

- Do not remove a diskette or turn off the computer while the drive light is on. This light indicates that the computer is copying data to or from a disk. If you interrupt this process, you can destroy data.
- Remove all diskettes before you turn off the computer.

If you have a hard disk drive, take these additional precautions:

- Never turn off the power to the computer when the hard disk drive light is on. This light indicates that the computer is currently copying data to or from the hard disk. If you interrupt this process, you can lose data.
- Never attempt to open the hard disk unit. The disk itself is enclosed in an air-tight container to protect it from dust.
- If you are going to move your computer (even to another part of the room), run the program on your diagnostics diskette called Prepare Hard Disk for Moving to move the read/write heads away from the recording area. See your Diagnostics manual for instructions.

Protecting your Data

There are two ways to avoid losing data you store on disk: you can make backup copies and you can write-protect your diskettes.

Making backup copies

It is a good idea to make copies of all your data and system diskettes. Copy all diskettes that contain programs, such as the master system diskettes that come with the Equity III+, and use only the copies. Store your original system diskettes in a safe place away from your working diskettes. Copy your data diskettes regularly (preferably every day) to keep them up-to-date, and store them away from your originals.

Your MS-DOS manual describes how to make a backup copy of your MS-DOS system diskette. To make backups of other MS-DOS diskettes, use the DISKCOPY command or the DU (Disk Utility) program.

If you have a hard disk, keep backup copies of all your program files on floppy disks, and regularly copy important data files to floppy disks as well. For more information on backing up a hard disk, see "Using a Hard Disk," below and your MS-DOS manual.

Write-protecting diskettes

You can write-protect a diskette to prevent its data from being altered. When a diskette is write-protected, you can copy data from it, but you

cannot store new data on the diskette or delete any files it contains. If you try to change data stored on a write-protected diskette, an error message displays.

To write-protect a 5¼-inch diskette, cover the small, rectangular notch shown in Figure 3-1 with an adhesive write-protect tab. Write-protect tabs usually come with new 5¼-inch diskettes when you buy them. To unwrite-protect a 5¼-inch diskette, remove the write-protect tab.

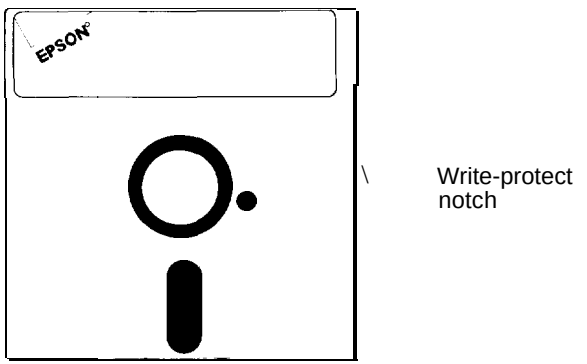

Figure 3-1. Write-protect notch

On a 3½-inch diskette, the write-protect device is a small switch on the lower-right corner on the back, shown in Figure 3-2. To write-protect this diskette, slide the switch down toward the edge of the diskette so there is a hole where the switch used to be.

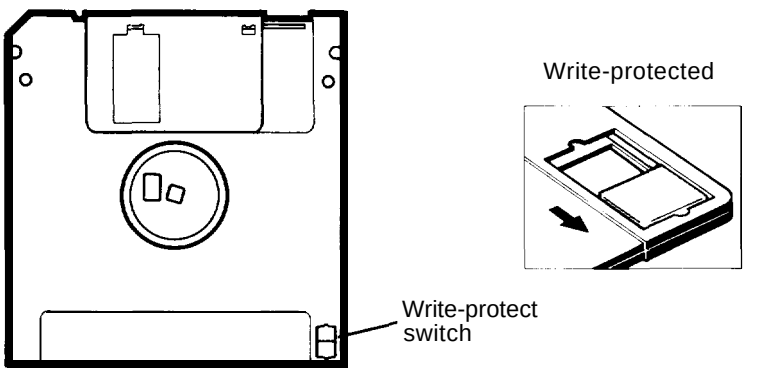

Figure 3-2. *Write-protect switch*

To unwrite-protect a 3¼-inch diskette, move the switch up toward the center of the diskette so the hole is covered.

Using a Single Floppy Disk Drive

An operating system expects the computer to have at least two physical disk drives, and it displays prompts and messages accordingly. If your system has a single floppy disk drive, MS-DOS treats your single drive like two logical drives. This helps you perform operations that normally require two floppy disk drives.

For example, if you give a command to copy from one drive to another, MS-DOS copies from the first diskette you place in the drive to the computer's memory. Then MS-DOS prompts you to insert another diskette and copies from memory to the diskette you place in the drive. When copying is complete, you see a prompt to insert the original diskette.

Because you may swap diskettes this way often, it is easy to forget which diskette is which. One way to avoid accidentally losing data is to hold the diskette for one drive in your left hand and the diskette for the other in your right. You can also write-protect your source diskette. For more information on using one floppy disk drive with MS-DOS, see your MS-DOS manual.

Using a Hard Disk Drive

The internal hard disk for the Equity III+ has a capacity of 40 megabytes-about 40 million characters. This is equivalent to approximately 120 double-density floppy disks. Using a hard disk reduces the number of floppy disks you need and eliminates much of the disk-swapping you do when you use floppy disks. You can do almost all of your work on the hard disk and copy your files to floppy disks as needed (to make backups, for example).

While the hard disk is very reliable, it is essential to back up all your hard disk files on floppy disks in case you lose some data accidentally, Use the MS-DOS BACKUP program to back up your hard disk files.

Although it has a lot of storage space, keep only files you use regularly on the hard disk, to ensure you always have plenty of space available. Store your other files on floppy disks.

Before you can use the Epson internal hard disk, you must do the following things to prepare it:

- Use the Setup program on your diagnostics diskette to prepare your system for using a hard disk, and then use the Format Hard Disk program to format the hard disk.

- Partition the hard disk to run the MS-DOS operating system using the MS-DOS program FDISK.
- Format the MS-DOS partition with the MS-DOS program SELECT.
- Copy the MS-DOS utility programs to the hard disk using SELECT

For instructions on running the diagnostics program, see your Diagnostics manual. For instructions on how to use the MS-DOS programs, refer to your MS-DOS manual.

Note: If you plan to use an operating system other than MS-DOS, you need to use that operating system to partition the hard disk and copy the system files to it.

Chapter 4

Installing Option Cards

Option cards are accessories you can install in your Equity III+ to provide extra capabilities. For example, you can add another disk drive or expand the computer's internal memory up to 15.5MB.

The Equity III+ has nine option card slots, so it can hold up to nine cards. A hard disk controller card occupies one slot (whether or not your system has a hard disk) and the parallel and serial interface and floppy disk controller card occupies another. The card (or cards) that controls your monitor occupies an additional slot (or slots).

You can buy option cards from Epson as well as other vendors. Multifunction cards that allow you to add features without using multiple option card slots are also available. Consult your dealer for more information.

This chapter describes how to remove and replace the main unit's cover, and install and remove an option card.

Removing the Cover

To install an option card, you need to remove the cover from your Equity III+.

WARNING: Never open the cover of the Equity III+ while it is plugged into an electrical outlet. Before you open the cover, turn off the power switches on the main unit and each peripheral, let the computer stand for a few minutes, and then unplug the power cable.

1. If the computer is locked, unlock it (with the key lock). Otherwise, you cannot take the cover off your system.

2. If the monitor is on top of the computer, lift it off and set it to one side. Turn the main unit around so the back panel faces you.

3. As shown in Figure 4-1, the top cover is secured by four screws on the back panel. Remove the screws and put them all safely to one side. They are small so be careful when you take them out.

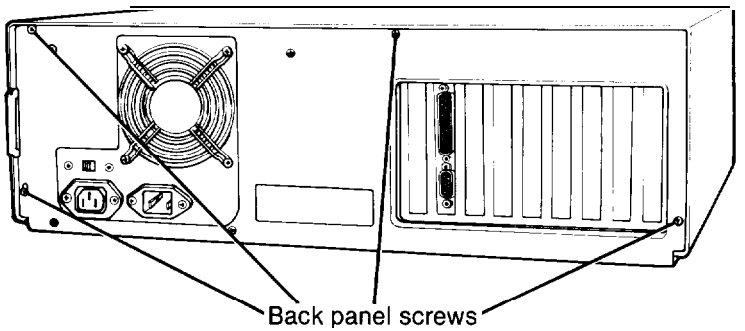

Figure 4-1. Buck panel mews

4. Turn the main unit around so the front panel faces you. Hold on to the two sides of the cover and carefully pull it straight toward you, away from the back of the computer, as shown in Figure 4-2, until it is about an inch past the power switch. The cover fits tightly, so if you have trouble moving it at first, keep pulling it back firmly.

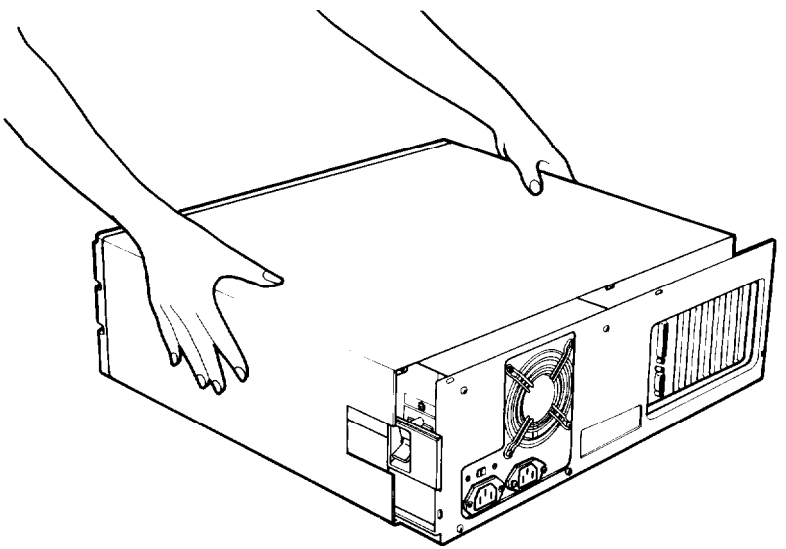

Figure 4-2. Sliding back the cover

5. When the back edge of the cover is a few inches away from the back panel, you can lift it off. Separate the sides of the cover from the bottom ledge of the computer by pulling them outward slightly, as shown in Figure 4-3. Then lift off the cover and set it aside.

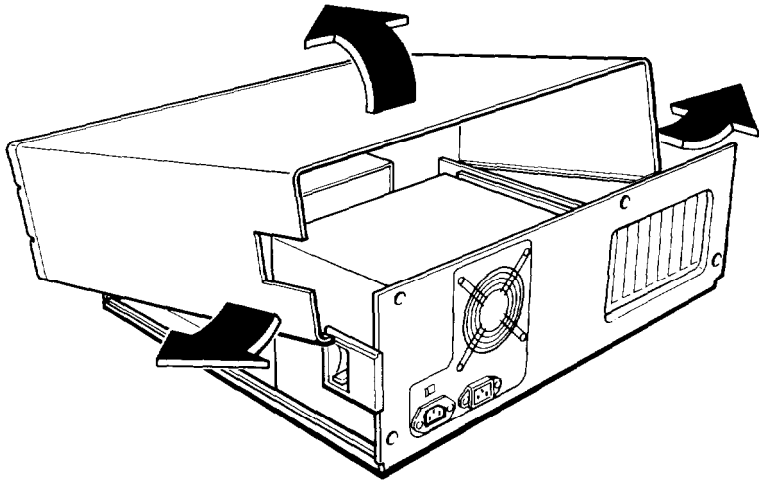

Figure 4-3. Removing the cover

Installing an Option Card

Figure 4-4 shows the nine option slots in the Equity III+ (two of which are occupied).

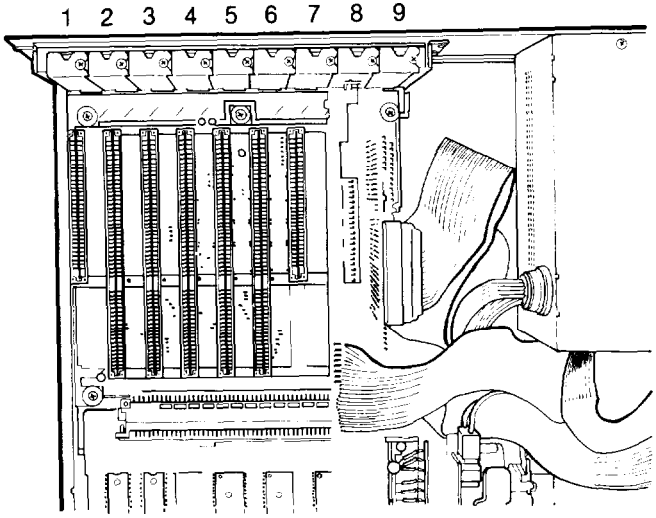

Figure 4-4. Option slots

Slot 8 contains the parallel and serial interface and floppy disk controller card, and slot 9 contains the hard disk controller card. The video card must be installed in slot 7. Slots 1, 7, and 8 are designed for 8-bit option cards and the other six--slots 2 through 6 and 9-are designed for 16-bit option cards. Figure 4-5 shows both types of cards. As you can see, the 16-bit card has a second connector.

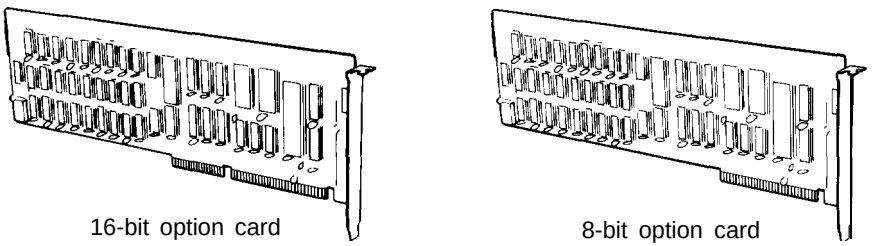

Figure 4-5. 16-bit and 8-bit option cards

Except for the video card, it does not matter which slot an option card occupies as long as the card fits in the slot. For example, you can place some 8-bit cards in a 16-bit slot. But if an 8-bit card has an additional skirt along the bottom (which looks like an extra long connector), it must go in an 8-bit slot.

The video card must be installed in slot 7. See Figure 4-4 to see how the slots are numbered. Also, some other cards must be installed in a specific slot. If you have such a card, the instructions that come with it specify which slot you need to use. Because the hard disk controller card must be connected to the hard disk, this option card is in slot 9, where it is closest to the hard disk. Leave it there.

Option cards fit in the slots only one way, but be sure to examine the card first and follow the instructions closely.

1. Decide which option slot you want to use. If the card has an external connector (such as a monitor card) you need to remove the option slot cover at the back of that slot. See Figure 4-6. Remove the retaining screw from the top of the metal option slot cover and keep it to secure the option card to the computer. Lift out the slot cover and keep it in a safe place in case you remove the option card later.

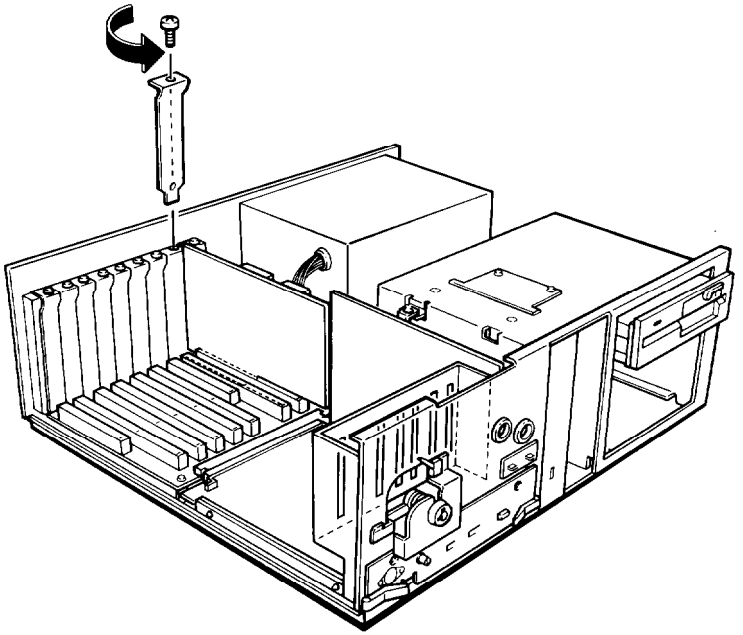

Figure 4-6. Removing *an* option *slot cover*

2. Unpack the option card and adjust any switches or jumper connections on it if necessary. (For example, a memory expansion card usually contains DIP switches that you need to set. See the option card instructions.)

Note: If the option card you are installing requires you to change any of the jumper connections on the Equity III+ main circuit board, memory card, or multi-function card, see Appendix A, 'Jumper Settings."

When you handle the card, be careful not to touch any of the contacts on the circuit board, especially the gold-edged connections. If you need to set it down before you install it, place it on top of its original packing material with the component side facing down.

Keep the card's packing materials in case you remove the card later.

3. Grip the card firmly by the top corners and position it at the top of the slot. Make sure the contact pins point down and the components face the inside of the main unit.

4. Insert the card in the slot as shown in Figure 4-7. When the card is almost all the way in, make sure the tab at the bottom of the metal adapter plate on the end of the card goes into the corresponding notch at the back of the computer.

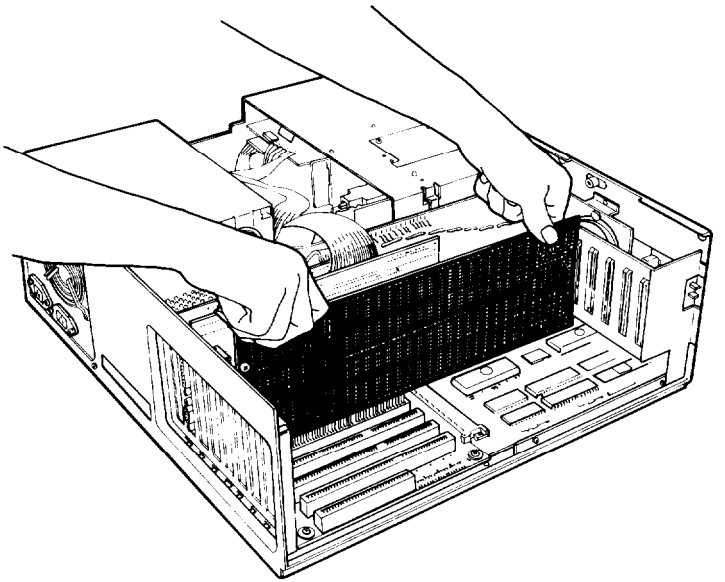

Figure 4-7. Inserting an *option card*

5. Once the connector pins are sitting in the connector slot, push the card downward firmly (but carefully) to fully insert it. If the card does not go in smoothly, do not force it-pull it all the way out and try again, keeping it straight.

6. Secure the adapter plate on the end of the card to the back of the computer with the retaining screw.

Removing an Option Card

To remove an option card, follow the same basic procedure you used to install it. Remove the screw holding the adapter and pull the card straight up and out of the connector. Then carefully wrap the card, preferably with the original packing materials, and place it inside its box for safe storage. Cover the end of the empty option slot with the original metal cover and retaining screw. If you modified anything in the post-installation setup (see below) be sure to change it back.

Replacing the Cover

After you install (or remove) an option card, follow these steps to replace the main unit's cover:

1. With the front of the computer facing you, position the cover on the computer as shown in Figure 4-8.

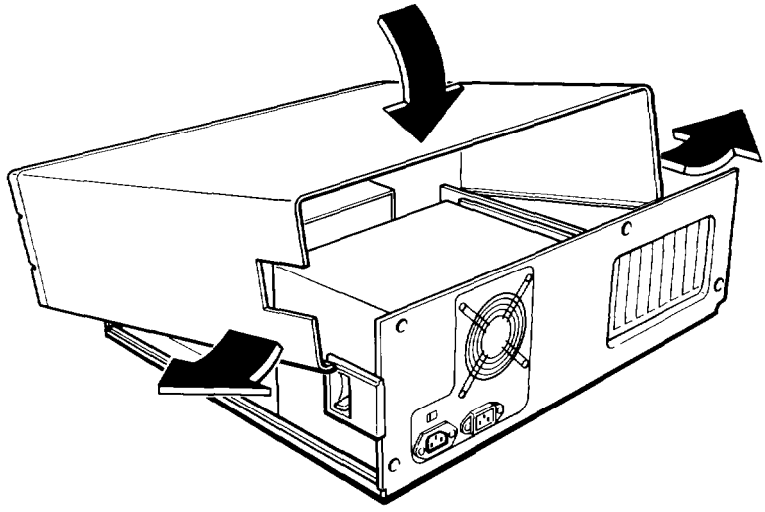

Figure 4-8. Replacing the cover

2. Pull the sides outward slightly and guide the curved edge on the bottom of the cover underneath the ledge on the bottom of the computer.

3. Lower the cover over the computer and slide it straight back until the front panel is flush with the diskette drive and key lock.

4. To secure the cover, replace the four screws on the back panel.

5. Return the main unit to its original position and place the monitor on top, if that is where you keep it. Then reconnect the main unit to the monitor, the keyboard, and any other peripherals you have.

6. Check to be sure the power switch on the main unit is off. Then reconnect the power cable to the back of the main unit and to an electrical outlet.

Post-installation Setup

After you install an option card (and replace the main unit's cover and reconnect the power cord and peripherals), you may need to run the Setup program on the diagnostics diskette to update the configuration information. For example, if you add a hard disk, you need to tell the computer that it has the additional drive. See your Diagnostics manual for instructions.

You may also need to add some commands in the configuration files on your system disk. See your MS-DOS manual for instructions.

When you finish installing an option and reconfiguring the system, you should test the option if possible. Some options come with their own diagnostic test programs, and you can test others with your diagnostics diskette that came with the Equity III+. These include:

- Expansion memory
- 80287 numeric coprocessor
- Serial and parallel ports
- Monitors and display adapters
- Disk drives.

See your Diagnostics manual for instructions.

Chapter 5

Troubleshooting

You should not encounter any serious difficulties as you set up and use your Equity III+. But if anything out of the ordinary happens, refer to this chapter. Usually, such a situation requires nothing more than adjusting a cable connection, repeating a software procedure, or resetting the computer.

You can use the suggestions here to solve most problems you may encounter. If the recommended solution does not work, consult an Epson dealer about servicing the computer.

WARNING: If you need to turn off the computer for any reason, always wait at least five seconds before you turn it back on. You can damage the Equity III+ if you turn it off and on rap. idly.

The Computer Fails To Start Up

If the computer does not start up when you turn on the power switch, follow these steps to find a solution:

1. Check to see if the power LED lamp on the front panel is lit. If it is not, remove any diskettes and then turn off the power. Wait five seconds, then turn the power back on.

2. If the power lamp still does not light up, turn off the power switch. Check to see that the power cable is securely connected to both the AC inlet on the back panel and the electrical outlet. Then turn the power back on.

3. If the computer still does not start up, check the electrical outlet. Plug a portable lamp into the outlet you are using for the computer and turn it on to see if the outlet supplies power.

The Video Display Does Not Appear

If the computer starts up but no image appears on the screen, follow these steps to solve the problem:

1. Check to see that the power indicator on the video monitor is lit. If it is not, turn off the monitor's power, wait five seconds, then turn the power back on. Wait to see if the display screen image appears.

2. Use the controls on the monitor to turn up the brightness and contrast.

3. Remove any diskettes, then turn off the power switches on the monitor and the main unit. Check that the monitor's power cable is securely connected to the electrical outlet and that the monitor cable is properly connected to both the monitor and the main unit. Turn both power switches back on.

4. Turn off the power switches on both the main unit and the monitor. Then check the electrical outlet for power. Plug a portable lamp into the outlet you are using for the monitor and turn it on to see if the outlet supplies power.

The Computer Locks Up or Freezes

If the computer locks up and does not respond to the keyboard, try the following:

1. Wait a few seconds. Some operations take longer to perform than others. For example, a spreadsheet program takes longer to recalculate an entire spreadsheet than to record one figure. Also, BASIC programs that have a lot of calculations to perform can take several minutes, or even hours. Be aware of the task the computer is performing and judge the time accordingly.

2. Check the key lock to see if it is locked. If it is, the computer does not respond to anything you enter on the keyboard. Turn the key to the left to unlock it.

3. If the computer remains locked up, follow the steps in Chapter 2 under "Resetting the Computer."

Floppy Disk Problems

If you have trouble with a diskette, check the following questions:

1. Is the diskette damaged? Copy the diskette and repeat the operation that caused the problem using the copy. (If you have trouble copying the entire diskette, some of the sectors may be bad. Try to copy single files with the Copy command.) If the operation works using the copy, the original diskette is probably damaged. Make another copy to use as a backup.

2. Have you inserted the right type of diskette? The diskette type is normally shown on the manufacturer's label. In the top drive, which has a storage capacity of 1.2MB, use 5¼-inch, double-sided, high-density, 96 TPI, soft-sectored diskettes. If you have a second floppy disk drive that is also 1.2MB, use the same type of diskettes in this drive.

   If you have a second floppy disk drive that has a storage capacity of 360KB, use double-sided, double-density, 48 TPI, soft-sectored diskettes in this drive.

   If you have a 720KB floppy disk drive, use double-sided, high-density, 135 TPI, soft-sectored diskettes.

   The three diskette types are not interchangeable between the different types of drives. The 720KB drives can use only the 3½-inch diskettes. You cannot read or write to a high-density diskette in a 360KB drive. You can read a double-density diskette in a 1.2MB drive, but do not write to it unless you have formatted it in a 1.2MB drive as a 360KB (or 320KB) diskette. See "Choosing Diskettes for the Equity III+" and "Drive and diskette incompatibilities" in Chapter 3.

3. Is the diskette write-protected? There may be a write-protect tab over the notch on the side of the diskette (5¼-inch) or the write-protect switch may be set (on a 3½-inch diskette). Before you remove the tab or move the switch, check the directory to see what files the diskette contains-it may contain information you do not want to change or lose. (Your operating system manual describes how to display a directory) Although you should normally write-protect all program diskettes, some programs store temporary files on the diskette. These programs do not work if you write-protect the diskette.

Hard Disk Problems

If you have problems with your hard disk when you first start to use it, check to see if it has been set up properly. See "Using a Hard Disk Drive" in Chapter 3 and refer to your MS-DOS manual.

If you cannot access data stored on your hard disk, you may have accidentally repartitioned or reformatted part or all of the hard disk. If you have not done so and your hard disk does not function properly, have an authorized Epson service center check your hard disk. Never open the air-tight container that encloses the recording disk.

Software Problems

If you have trouble with a software program, check the following list of possible problems and solutions:

1. The software program does not start. Check that you are following the correct procedure for your operating system. Be sure you insert the system diskette in drive A (the top drive).

2. An application routine does not work. Refer to the software manual and complete the routine according to the instructions. If this does not work, reset the computer (as described in Chapter 2 under "Resetting the Computer"), reload the program, and try the routine again.

To operate properly, some programs require the computer to run at 6 or 8 MHz. Try changing the CPU speed with the switch on the front panel. See "Selecting Execution Speed" in Chapter 2. Be sure to reset the computer after you change the speed.

Printer Problems

Your printer manual describes methods to solve most printer problems. If your printer does not work correctly right after you install it, make sure the printer has power and connects to the computer properly. The printer manual tells you how to connect your printer.

If you have a serial printer, or if you have problems with paper feeding, check the printer manual for the printer's DIP switch settings. The DIP switches on a printer help it communicate properly with the computer.

Option Card Problems

If you install an option card and get unexpected results, check the following:

1. Is the option card installed correctly?
2. Did you follow the setup and operation procedures in the option card instructions?
3. Did you set any necessary DIP switches or jumpers on the option card? See your option card instructions.
4. Did you change any necessary jumper settings in the main unit? See Appendix A, "Jumper Settings."
5. If you added an external device, did you use the proper cable to connect the peripheral to the port or option card connector on the back panel?
6. Did you perform any necessary post-installation setup procedures for the operating system? See your Diagnostics, MS-DOS, or other software manual for instructions.

Appendix A

Jumper Settings

This appendix describes how to set the jumpers inside the Equity III+ if you install optional devices that require different jumper settings in the main unit. It is best if your dealer installs the option and makes all the necessary adjustments when you buy it. If you decide to do it yourself, be very careful when you follow the procedures in this appendix. There are many system components which can be damaged accidentally.

The Equity III+ jumpers you may need to change are on the:

- Main circuit board
- Memory card
- Multi-function card (parallel port, serial port, and floppy disk controller).

Figure A-l shows where each of these cards is located in the computer (it also identifies the hard disk controller card).

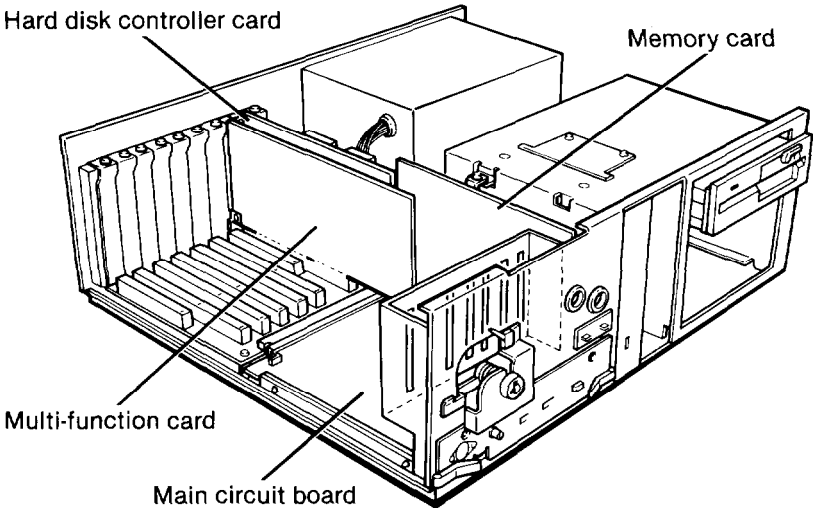

Figure A-1. Location of cards

Caution: The jumpers on these cards are preset at the factory in default positions. Do not change any of them unless you are sure the option card you are installing requires different settings. If you have any doubts, ask your Epson dealer.

The procedure for changing a jumper setting is given first, then the jumper functions and locations for each card are described separately. All the instructions assume you have already removed the cover from the main unit. For instructions on removing the cover, replacing the cover, and installing and removing option cards, see Chapter 4.

Changing a Jumper Setting

A jumper's setting is determined by where the jumper is placed: either between pin A and the middle pin (position A) or between pin B and the middle pin (position B). Figure A-2 shows both positions.

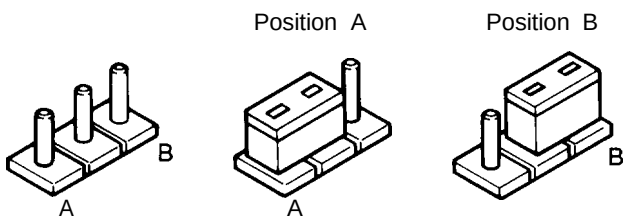

Figure A-2. Jumper positions

To move a jumper from one position to the other, use needle-nose pliers or tweezers to lift it off the board and gently move it to the other position. Be careful not to lose the jumper or leave it out of the computer.

Memory Card Jumpers

The jumpers on the memory card control the following functions:

- Amount of RAM (main memory). If you install a memory card that needs to use part of the main memory, you may need to change the jumper settings to disable some of the main memory on the memory card. Be sure to check your memory card instructions to see if this is necessary.
- EPROM size. You can change the EPROM size jumper if you install a different size of EPROM.
- Which pair of EPROMs to use. Change these jumpers if you want to use the alternate pair of EPROMs (there are four EPROMs in all) for a special application.

In all cases, make sure you need to alter the jumper settings for the option you are installing before you change anything.

Table A-l shows the functions for the jumpers on the memory card.

Table A-1. Memory card jumper settings

Jumper number							Function
1	2	3	4	5	6	7	
A	A	A					640KB *
B	A	A					512KB (disable upper 128KB)
B	B	A					256KB (disable upper 384KB)
B	B	B					0KB (disable all RAM)
			A	A			Select EPROM size 27128
			B	B			Select EPROM size 27256
					A	A	Select EPROM pair 24A and 24B
					B	B	Select EPROM pair 23A and 23B*

* Default setting

To access the memory card jumpers, you need to remove the card from the main unit first:

1. Remove the retaining screw from the bracket on the memory card, as shown in Figure A-3.

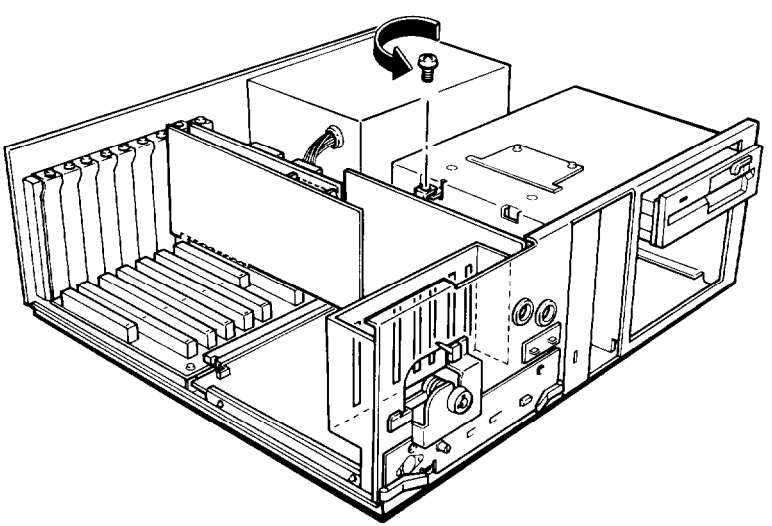

Figure A-3. Removing memory card retaining screw

2. Lift the card gently out of the computer, taking care not to catch it on any cables inside the computer. Set it on a soft surface, such as a towel, with the component side facing up,

Figure A-4 shows the locations of the seven jumpers. Refer to Table A-l above to set them as needed.

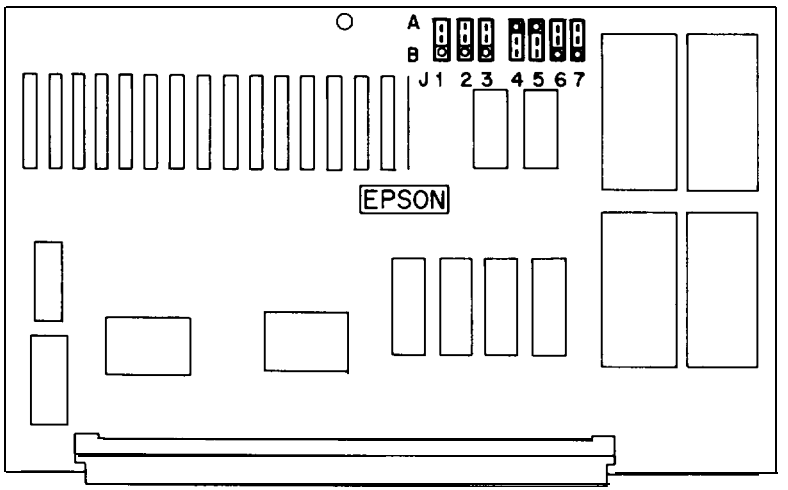

Figure A-4. Memory card jumpers

When you finish setting the jumpers, replace the memory card in the computer and secure it with the retaining screw.

Main Circuit Board Jumpers

The jumpers on the main circuit board control the following functions:

- CPU clock. Leave this jumper in its factory setting.
- Math coprocessor clock speed. If you or your dealer installs an 80287 math coprocessor, you may need to set the jumpers for a different clock speed. The jumpers determine the speed of the coprocessor.

  As it is easy to damage a math coprocessor, you should have your dealer install it for you. In addition to checking the jumper settings, you or the dealer should also use the diagnostics' Setup program to change the settings in the CMOS RAM, and use the System Diagnostics program to test the coprocessor.

- Number of wait states for EPROM. If necessary, you can change the number of wait states (1 or 2) used by the EPROM. Please consult your dealer for assistance.
- Number of wait states for 16-bit device access. If necessary, you can change the number of wait states (1, 2, 3, or 4) required by the 16-bit optional devices. Please consult your dealer for assistance.

Table A-2 shows the functions for the six jumpers on the main circuit board.

Table A-2. Main *circuit board jumper* settings

Jumper number						Function
1	2	3	4	5	6	
A						Factory-set
	B	A				Set coprocessor at 2/3 of CPU speed
	A	B				Set coprocessor clock at 8 MHz •
			A			2 wait states for EPROM access *
			B			1 wait state for EPROM access
				A	A	4 wait states for 16-bit device *
				B	A	3 wait states for 16-bit device
				A	B	2 wait states for 16-bit device
				B	B	1 wait state for 16-bit device

• Default setting

To access the main circuit board jumpers, you must remove the board from the main unit. Do not try to access the jumpers while the board is still in the computer.

1. Remove the memory card from the computer, as described above.
2. With the front of the computer facing you, remove the four screws that secure the circuit board to the computer, as shown in Figure A-5.

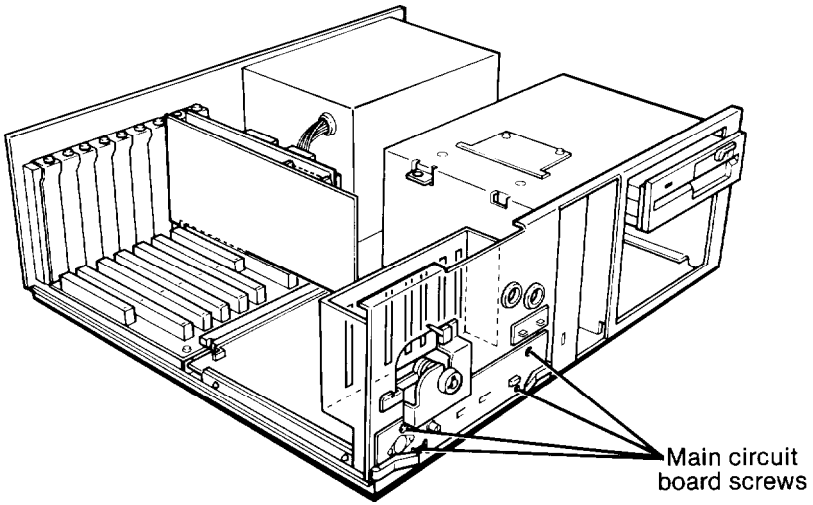

Figure A-5. Removing *circuit board screws*

3. The small circuit board (on the front of the computer), which contains the power and hard disk LEDs, is connected to the hard disk controller card by a black and red twisted cable. Unplug the connector from the hard disk controller card-the connector is labeled CN6 on the card-as shown in Figure A-6, and lay the cable to one side.

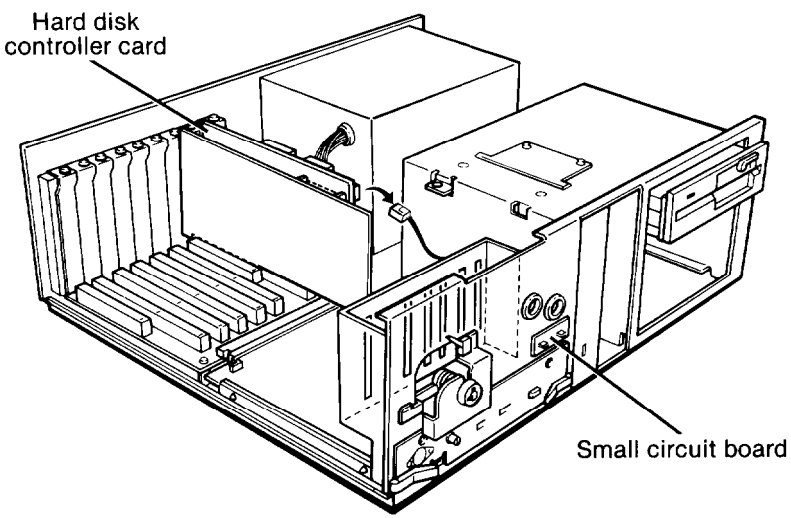

Figure A-6. Unplugging connector CN6 from hard disk *controller card*

4. Pull the white levers on the front of the circuit board apart to maneuver the board slightly away from the computer, about 1/2 inch. See Figure A-7. Be careful not to strain any connecting cables.

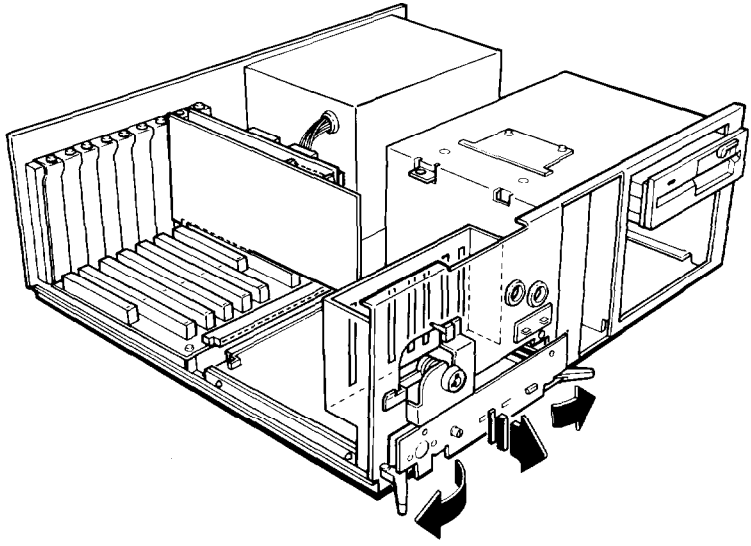

Figure A-7. Removing circuit board

5. Locate the connector marked CN6 at the back right corner of the circuit board. Squeeze the tab slightly and unplug it from the circuit board, as shown in Figure A-8.

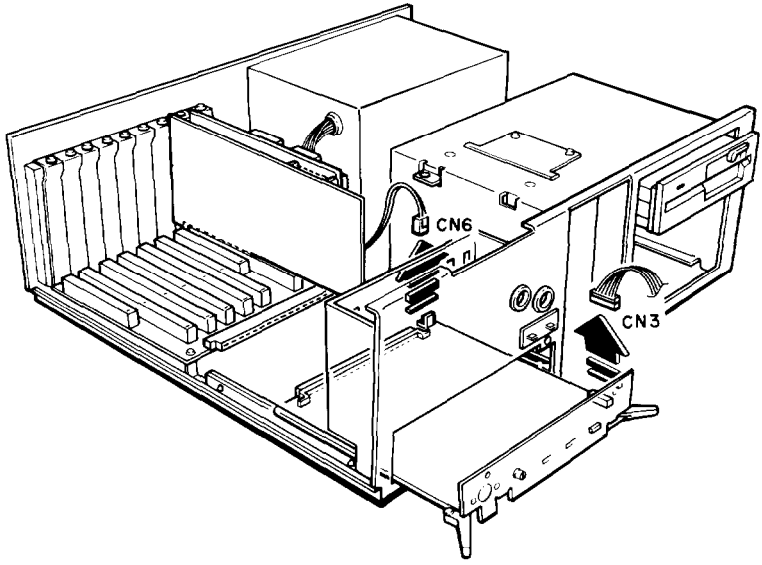

Figure A-8. Unplugging connectors CN6 and CN3 from the circuit board

6. Pull the circuit board out two inches more. Locate the connector marked CN3 on the front right corner of the circuit board (see Figure A-8 above) and carefully unplug it.

7. Remove the main circuit board completely from the computer.

Figure A-9 shows the locations of jumpers 2 and 3. Refer to Table A-2 above to set them as needed.

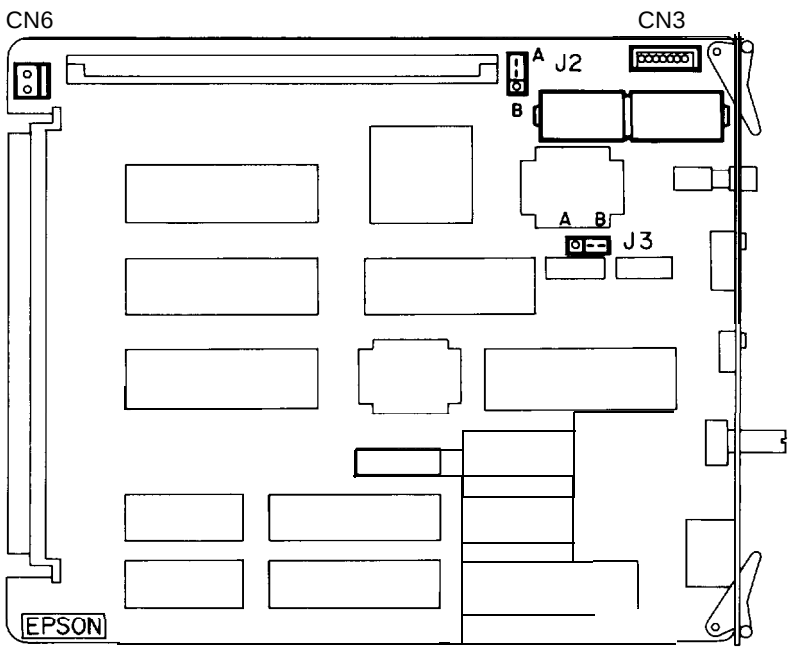

Figure A-9. Main circuit board jumpers

When you finish changing the jumpers, follow these steps to reinstall the main circuit board:

1. Slide the board back into the computer, guiding it along the black tracks on either side of the opening, until it sticks out two inches.

2. Reconnect the connector marked CN3 on the front right corner of the main circuit board.

3. Continue sliding the board into the computer until it is just 1/2 inch short of being in all the way.

4. Reconnect the connector marked CN6 on the back right corner of the main circuit board.

5. Slide the board the rest of the way in. Make sure no cables or loose connectors are blocking its path. It should snap into place as it connects with the option slot board.

6. Reconnect the connector marked CN6 at the end of the LED cable to the hard disk controller card.

7. Replace the four screws securing the circuit board to the front of the computer.

8. Carefully replace the memory card in its slot and secure it with the retaining screw.

Multi-function Card Jumpers

The jumpers on the multi-function card control the parallel port address and the serial port address. You normally address the parallel and serial ports in the computer as the primary ports (LPT1 and COM1). However, if you install an additional parallel or serial port and want it to be the primary port, you need to change the jumpers on the multi-function card so the built-in port becomes secondary (LP1-2 and COM2).

Table A-3 shows the jumpers on the multi-function card that control the parallel port.

Table A-3. Multi-function curd jumper settings for parallel port

Jumper number			Function
3	4	10	
A	A	A	Enable built-in port as primary *
A	B	B	Enable built-in port as secondary
B	A	A	Enable compatibility with IBM monochrome display/printer adapter
B	B		Disable built-in port

• Default setting

Table A-4 shows the jumpers on the multi-function card that control the serial port.

Table A-4. Multi-function card jumper settings for serial port

Jumper number 5	6	9	Function
A	A	A	Enable built-in port as primary *
A	B	B	Enable built-in port as secondary
B			Disable built-in port

* Default setting

To access the multi-function card jumpers, you need to remove the card from the computer:

1. Unplug the disk drive cable from the card as shown in Figure A-10. Pull it straight up and out, then lay it to one side.

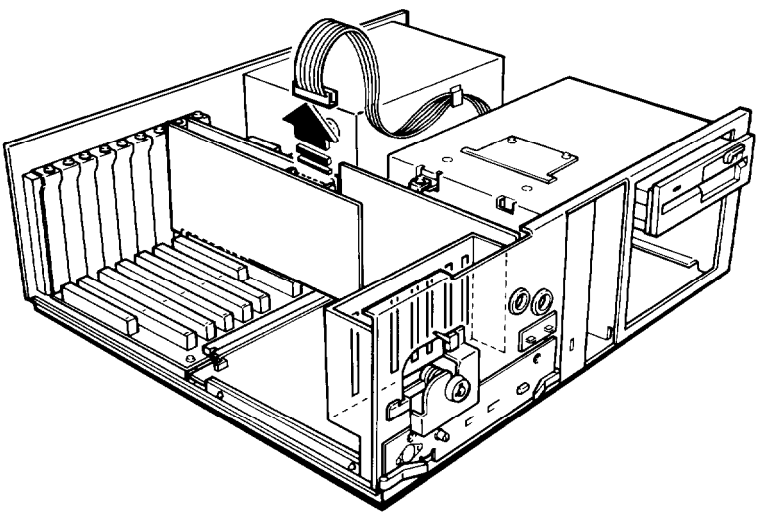

Figure A-10. Disconnecting *disk drive cable from multi-function card*

2. Remove the retaining screw from the multi-function card at the back panel of the computer, as shown in Figure A-11.

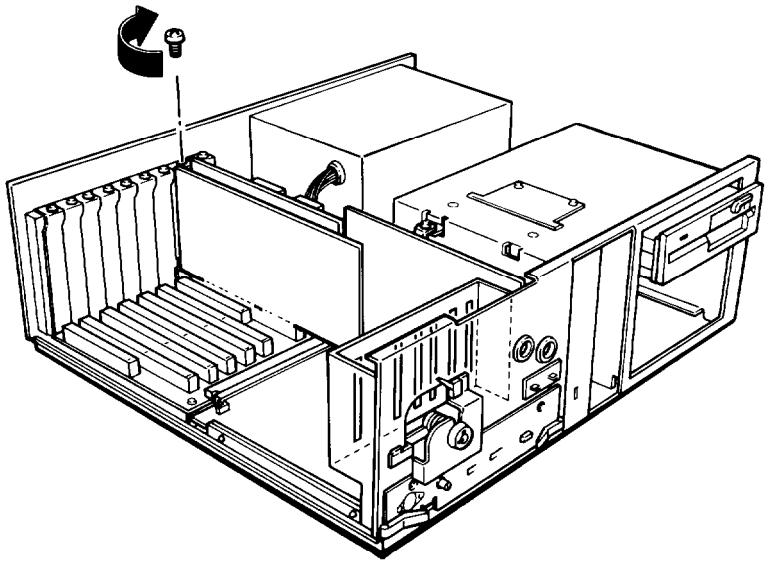

Figure A-11. Removing *multi-function card retaining screw*

3. Remove the card from the slot (pull it straight up) and set it on a soft surface with the components facing up.

Figure A-12 shows where the jumpers are located. Change them as needed and then reverse the three steps above to reinstall it.

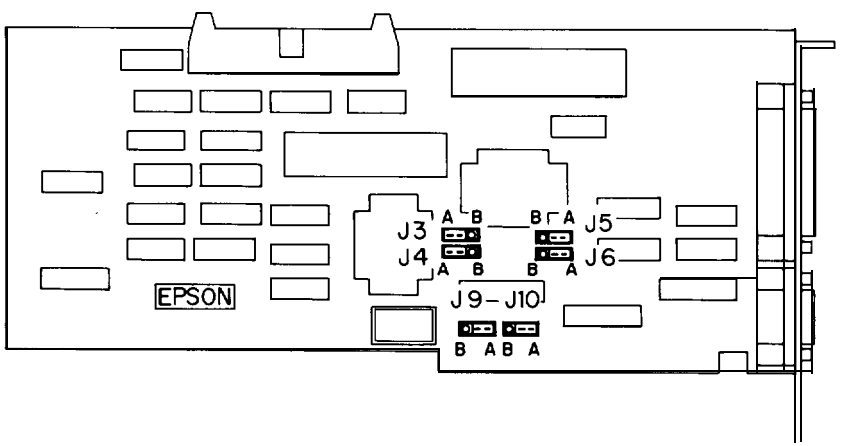

Figure A-12. *Multi-function card jumpers*

Appendix B

Equity III+ Specifications

CPU and Memory

16-bit CPU	80286 microprocessor, 6,8, or 12 MHz clock-rate, switch-selectable
	Real address (8086-compatible) and protected virtual address (multi-tasking or multi-user) modes
	24-bit address and 16-bit data bus
Main memory	640KB RAM on memory card; expandable to 15.5MB maximum with expansion cards
ROM	64KB, expandable to 128KB, selectable alternate ROM for custom use
Math coprocessor	80287 support (optional)

Controllers

Floppy disk	Supports up to two drives available in any of three formats: double-density (360KB), double-density (720KB), or high-density (1.2MB); controller on multifunction card
Hard disk	Supports up to two drives available in multiple formats (including 20MB and 40MB); installs in option slot

Interfaces

Serial	RS-232C, programmable, asynchronous, DB-9P male connector
Printer	Standard 8-bit parallel, DB-25S female connector

Interfaces (continued)

Option slots	Nine IBM-compatible input/output expansion slots: one occupied by hard disk controller card and another occupied by parallel and serial interface and floppy disk controller card; seven slots available for options in base configuration: five with 16-bit bus and two with 8-bit bus
Speaker	Internal, with volume control
Clock/calendar/ RAM	Real-time clock, calendar, and 50-byte CMOS RAM for configuration; battery backup

Power Supply

	Switching type, fan-cooled, 115/230 VAC, 200 W; +5 VDC, +12 VDC, -5 VDC, -12 VDC; 50/60 Hz

Mass Storage

	Four drives maximum, configurable using five half-height slots (two vertical mounts and three horizontal mounts)
Standard	5¼-inch, half-height floppy disk drive; double-sided, high-density, 1.2MB storage capacity
Optional	5¼-inch, half-height floppy disk drive; double-sided, high-density, 1.2MB storage capacity
Optional	5¼-inch, half-height floppy disk drive; double-sided, double-density, 360KB storage capacity
Optional	3½-inch, half-height floppy disk drive; double-sided, high-density, 720KB storage capacity
Optional	3½-inch or 5¼-inch, half-height internal hard disk drive; 20MB storage capacity (formatted)

Mass Storage (continued)

Optional	5¼-inch, half-height or full-height internal hard disk drive; 40MB storage capacity (formatted)

Keyboard

	Detachable, three positions, 101 sculpted keys
Layout	58-key QWERTY main keyboard; 17-key numeric/cursor pad; 10 cursor keys; 16 function keys (user-definable)
Function keys	Three levels (normal/shift/alternate), user-definable

Environmental Requirements

Temperature	Operating range: 41° to 104°F (5° to 35°C)
	Storage range: 22° to 158°F (-20° to 60°C)
Humidity	Operating range: 20% to 80%, non-condensing
	Storage range: 20% to 90%, non-condensing

Physical Characteristics (CPU Only)

Width, inches (mm)	19.46 (499)
Depth, inches (mm)	17.24 (442)
Height, inches (mm)	6.6 (169)
Weight, pounds (kg)	31.97 (14.5) Single floppy disk drive 35.71 (16.2) Single floppy disk drive and one 40MB hard disk

Power Requirements

115/230 VAC ± 20%, 50/60 Hz, 5 amps; 200 W output capacity

Options

Monochrome video card	Supports Epson- or IBM-compatible monochrome monitor; 80-character x 25-line display; 9 x 14 character block; installs in option slot
TTL green or amber monochrome monitor (12-inch diagonal)	High-persistence, P-39 phosphor screen; etched surface to reduce glare; 22 MHz video bandwidth; 35 W
Color/graphics video card	Supports Epson- or IBM-compatible RGB color or composite video monitor; 40-character x 25-line display (low-resolution text); 80-character x 25-line display (high-resolution text); 640 x 200 (high-resolution graphics), 320 x 200 four colors, 160 x 200 eight colors; installs in option slot
RGB color monitor (13-inch diagonal)	High-contrast screen; 16 colors; etched surface to reduce glare; 18 MHz video bandwidth
Multiple graphics video card	Supports Epson- and IBM-compatible monochrome or color monitor; monochrome text, color graphics, and Hercules (monochrome) graphics, switch-selectable; installs in option slot
Enhanced graphics video card	Supports Epson- and IBM-compatible monochrome, color, or enhanced color monitor; monochrome text (80-character x 25-line display), Hercules text (80-character x 43-line display); color graphics, 640 x 200 pixels B/W; monochrome graphics, 640 x 350; color/graphics, 640 x 350, 16 colors

Appendix C
Glossary

ASCII

American Standard Code for Information Interchange. A standardized coding system for representing characters, such as numbers, letters, and graphic symbols, An ASCII character occupies one byte of storage. Files transmitted in ASCII code can be used by many different computers, printers, and programs.

Asynchronous

A method of data transmission in which one machine sends data one character at a time to another, without either machine preparing for the transmission.

Backup

An extra copy of a program, data file, or disk, kept in case your working copy is damaged or lost.

Bit

A binary digit (0 or 1). The smallest unit of computer storage. The value of a bit represents the presence (1) or absence (0) of an electric charge.

Boot

To load a program or an operating system.

Byte

A sequence or group of eight bits that represents one character.

Character

Anything that can print in a single space on the page or the screen. Includes numbers, letters, punctuation marks, and graphic symbols.

CMOS

Complementary Metal-Oxide Semiconductor. A method for making silicon chips.

Code

A system of symbols for representing data or instructions. Also any software program or part of a program.

Command

An instruction you enter on the keyboard to direct your computer to perform a specific function.

Configuration

The particular setup of a group of components. For example, a CPU with two floppy disk drives, connected to a monochrome monitor and a printer is a typical system configuration.

Control code

A command (generated when you hold down **Ctrl** and press another key on the keyboard) that instructs your computer to perform a specific function.

CPU

Central Processing Unit. The piece of hardware which interprets instructions, performs the tasks you indicate, keeps track of stored data, and controls all input and output operations.

Cursor

The highlighted marker which shows your position on the screen and moves as you enter and delete data.

Data

Information stored or processed by a computer.

Data diskette

A formatted diskette used to store files.

Diagnostics

The tests and procedures the computer performs to check its internal circuitry and set up its configuration.

DIP switches

Small switches on a piece of hardware such as a CPU, a printer, or an option card. DIP switch settings control various functions and provide a system with information about itself. DIP stands for Dual In-Line Package.

Directory

A list of the files stored on a disk or a part of a disk.

Disk

The collective term for both hard disks and floppy disks (diskettes).

Disk drive

The physical device which allows the computer to read from and write to a disk. A floppy disk drive has a disk slot on the front panel of the main unit into which you insert diskettes. A hard disk is permanently fixed inside the main unit, hidden behind the front panel.

Diskette

A flat piece of flexible plastic coated with magnetic material and used to store data permanently. Also called floppy disk.

DOS

The Disk Operating System that controls the computer's input and output functions. See Operating system.

Double-density

A type of diskette format that allows you to store twice as much data as the standard-density format. A double-density diskette for the Equity III+ has a storage capacity of 360KB.

File

A group of related pieces of information called records, or entries, stored together on disk. Text files consist of words and sentences. Program files consist of code and are used by computers to interpret and carry out instructions.

Floppy disk

See Diskette.

Format

To prepare a new disk (or erase an old one) so that it can receive information. Formatting a disk divides it into tracks and sectors and creates addressable locations on it.

Graphics

Lines, angles, curves, and other nonalphanumeric data.

GW-BASIC

Microsoft's extended version of the Beginner's All-purpose Symbolic Instruction Code. A programming language designed to be easy to use and understand.

Hard disk

The enclosed unit used to store data permanently. Unlike a floppy disk, it is fixed in place. It can process data more rapidly and store many more files than a floppy disk.

Hardware

Any physical component of a computer system, such as a monitor, printer, keyboard, or CPU.

High-density

A type of diskette format that allows you to store up to 1.2MB of data.

Input/output port

See Port.

Interface

A physical or software connection used to transmit data between equipment or programs.

Kilobyte (KB)

A unit used to measure storage space (in a computer's memory or on a disk). One kilobyte equals 1024 bytes.

LED

Light Emitting Diode. A substance that illuminates when electricity passes through it, like the indicator lights on the front panel of the Equity III+.

Main unit

The Equity III+ computer.

Megabyte (MB)

A unit used to measure storage space (in a computer's memory or on a disk). One megabyte equals 1,048,576 bytes.

Memory

The area where your computer stores data. Memory contents can be permanent and inalterable (ROM) or temporary (RAM).

Microprocessor

A small version of a CPU contained on one semiconductor chip.

Modem

A device which allows a computer to transmit signals over telephone lines so it can send and receive data. Modem stands for Modulator/DEModulator.

Monitor

The piece of hardware that contains the screen and displays information.

Monochrome monitor

A monitor that displays in only one color, such as green or amber, as opposed to a color monitor which can display in several colors.

Mouse

A device used (as an alternative to a keyboard) to control a pointer on the screen and operate a program.

MS-DOS

An operating system from Microsoft. See DOS, Operating system.

Operating system

A collection of programs that allow a computer to control its operations. The operating system determines how programs run on the computer and supervises all input and output-for example, MSDOS.

Option card

A card you install inside the Equity III+ main unit to provide additional capabilities, such as more memory, a hard disk drive, or a mouse.

Parallel

The type of interface which transmits data in groups of bits. See Interface, Serial.

Partition

To divide a hard disk drive into separate sections for use by different operating systems.

Peripheral

A device (such as a printer or a modem) connected to a computer that depends on the computer for its operation.

Port

A physical input/output socket on a computer where you can connect a peripheral.

Program

A disk file that contains coded instructions and tells a computer what to do and how to do it.

PROM

Programmable Read-Only Memory. A PROM is a ROM that can be altered.

Quad-density

A type of diskette format that allows you to store twice as much data as the double-density format. A double-sided quad-density diskette for the Equity III+ has a storage capacity of 720KB.

RAM

Random Accesss Memory. The part of memory that a computer can both read and write to. The programs you use are temporarily stored in RAM. All data stored in RAM is erased when you turn off the power.

Read

To copy data from one area to another. For example, when you open a text file stored on disk, the computer reads the data from the disk and displays it on the screen.

Read/write head

The physical device inside a disk drive that reads and records data on the magnetic surface of a disk.

Reset

To reload a computer's operating system so you can retry a task or begin using a different operating system. Resetting clears RAM.

RGB

Red Green Blue. An RGB monitor displays in high-resolution color.

ROM

Read Only Memory. A portion of memory that can only be read and cannot be used for temporary storage. ROM retains its contents even when you turn off the power.

RS-232C

A widely-used, standard type of serial interface. You can easily connect RS-232C-compatible devices to the Equity III+.

Sector

A contiguous section of a disk track that provides an address at which the computer can access data.

Self test

The initial diagnostics procedures a system performs to check its hardware.

Serial

The type of interface which transmits data one bit at a time. See Interface and Parallel.

Software

The programs that enable your computer to perform the tasks and functions you indicate.

System diskette

A diskette that contains the operating system.

Tracks

Addressable concentric circles on a diskette, resembling the grooves on a record, which help to divide the diskette into separate accessible areas. There are 40 tracks on each side of a double-sided, double-density diskette and 80 tracks on each side of a double-sided, quad-density or a double-sided, high-density diskette.

Write

To store data on a disk.

Write-protect

To prevent a diskette from being overwritten by placing a write-protect tab over the notch on the side of the diskette (5¼-inch) or setting the write-protect switch (3½-inch). When a diskette is write-protected, you cannot erase, change, or record over its contents.

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